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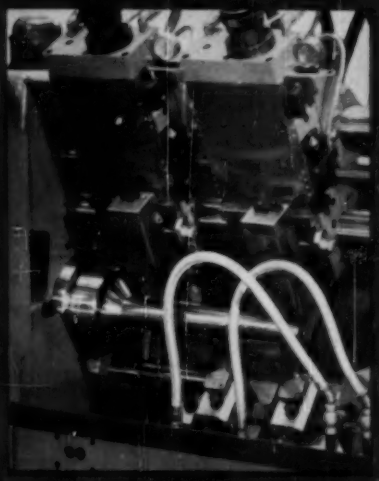
JANUARY 1955

McGRAW-HILL DIGEST

INTERNATIONAL BUSINESS AND INDUSTRY



GOOD BUSINESS: that's the outlook for the world as the new year begins. Nearly every country can look forward to a business upsurge p9

PLANNING an office workload lets you know in advance how big a staff you need to do a given job. And it points out where economies lie p12

MECHANIZED HANDLING cuts labor costs 50% when scoop truck is tied in to conveyor system p17

TRENDS appearing in new European machine tools: flexibility and originality in design ideas p28

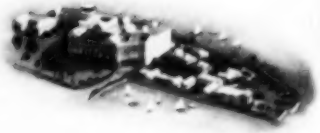
TEAMWORK makes a new product. Manufacturing can make the difference between success and failure p31

EPOXIES' newest job: insulate electric motors. Severe operating conditions, moisture, heat, corrosion, mean nothing to this material p41

Significant Sign for Travelers

in SOUTH AMERICA MEXICO BERMUDA

MEXICO CITY
Hotel Reforma



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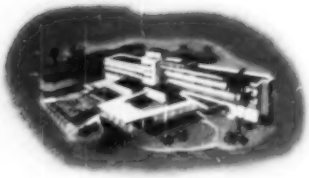

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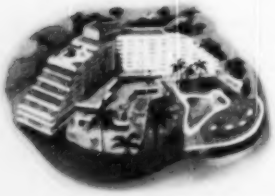

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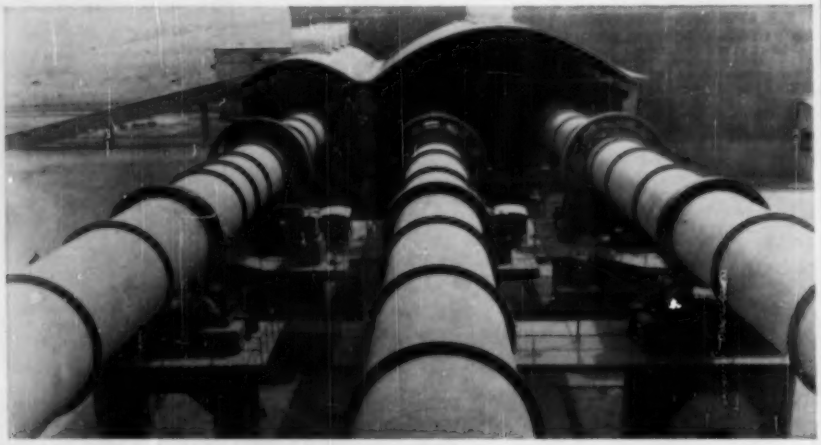

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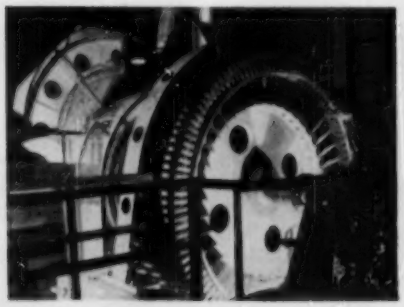

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. . . the best from 44 business magazines—see p44

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January, 1955 McGRAW-HILL DIGEST Vol. 10—No. 1

Member—Audit Bureau of Circulations

Published monthly by McGraw-Hill International Corporation for circulation in all countries of the world except the United States and Canada. *Publication office:* 99-129 North Broadway, Albany 1, N. Y., U. S. A. *Executive and editorial offices:* 330 West 42nd St., New York 36, N. Y., U. S. A. Donald C. McGraw, Chairman of the Board; Willard T. Chevalier, President; Eugene P. Warner, Senior Vice-President; Joseph A. Gerardi, Treasurer; John J. Cooke, Secretary; J. C. Stark, Vice-President, Publications Division; K. Fresbrey Bliss, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Director of Circulation.

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BUSINESS TRENDS

U. S. BUSINESS in 1955 will be better than in 1954. It may be substantially better. This will inevitably have a favorable impact on your business. How much impact depends on the extent to which you (or your country's economy—also, see p9) will be helped by increased U. S. raw-materials consumption, a higher level of U. S. imports, and more U.S. private investment abroad. All three trend upward in a good year.

Three main indicators point the way to what you can expect of U. S. business this year. They are: industry plans for spending on capital equipment and inventories, surveys of probable consumer spending, plans for government spending.

U. S. industry, according to a McGraw-Hill survey, intends to invest 5% less in the coming year in new plants and equipment. Total outlay will be about $20.7-billion. Only the petroleum industry plans to spend more than last year—about 1% more. The big increase will come in inventories and should more than offset the 5% drop.

Inventories set off the recent U. S. recession. In September 1953, they stood at $82-billion. In October, consumer buying slowed slightly and manufacturers started a sharp cutback of production, which slumped from a record index rating of 136 in August 1953 to a low of 123 in July 1954. During this period, inventores were reduced by some $4-billion.

The turning point has now been reached, and there is an obvious trend toward restocking. Under the spur of increased automotive output and stepped up buying of consumer durables, steel production has moved ahead until, in the last weeks of November 1954, it stood at 80% of rated capacity and showed promise of going further (McG-H Digest, p7, Dec '54).

The impetus to build greater inventories comes in part from surveys of consumer spending plans for the coming year. The surveys point to a big market. U. S. industries are overwhelmingly optimistic about sales prospects for 1955.

In spite of the fall-off in production, with consequently smaller pay checks, consumers in the late months of 1954 showed little or no tendency to cut down on buying. Where income dropped, consumers have showed a willingness to dip into savings to maintain their level of purchasing. Now, with increased personal income and a measurable demand for goods and services, industry looks forward to a big year.

Personal income in the U. S. may rise as much as $8-billion this year. To this can be added another $1-billion of credit. And the experts expect the entire $9-billion to be utilized.

Total construction—residential and non-residential—seems to be headed for another record year. Current estimates by the Departments of Commerce and Labor say it may total some $39.5-billion, compared to $37-billion for last year.

New private homes are expected to account for about $15-billion, and private expenditures on structures other than residences for another $12.4-billion. This will not only increase the demand for building materials, but will also entail other construction of sewerage, roads, schools, and stores. And all this construction will stimulate the market for accessories, appliances, tools, and furniture.

Government spending for the coming year will probably hold somewhere near current levels. Some predict that in line with the Administration's avowed intention of balancing the budget, it may drop slightly. Prior to the elections in November this was a possibility.

The Democratic party, now in control of Congress and making plans for the 1956 presidential election, will take strong measures to prevent any increase in unemployment. Unless the employment picture improves markedly during the first quarter of 1955, Congress will apply strong pressure for a boost in federal spending.

The sum of all these factors can best be expressed in terms of the country's gross national product—total output of goods and services. You can expect the U. S. gross national product to average out for this year at somewhere between $366- and $370-billion—well up from 1954's $356-billion and even higher than 1953's record of $364.9-billion.

U. S. business over the next 20 years, as analysed by the McGraw-Hill Department of Economics in a recent study (McG-H Digest, p7, Sept '54), has a tremendous potential for growth. Gross national product by 1970, following predictable trends, will reach $560-billion. Greatest increase will be in the field of consumer-goods production. This pre-supposes an output-per-man-hour increase of 2.5% and 65% more industrial capacity. Of prime importance to you, imports of both consumer items and particularly raw materials will grow apace. Write us if you want a copy of this study, "The American Economy—Prospects for Growth."

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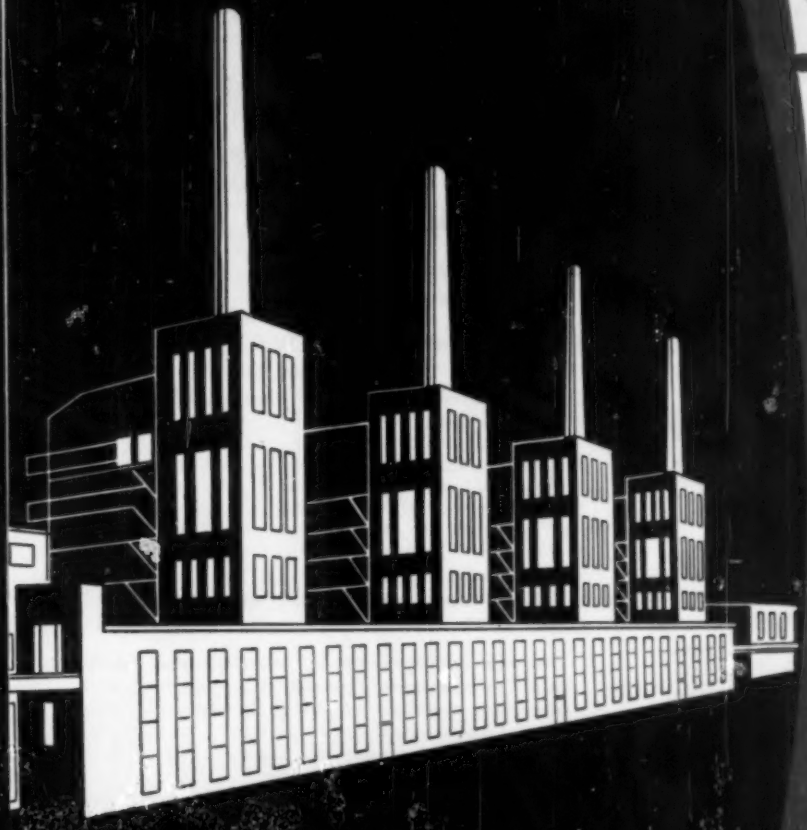

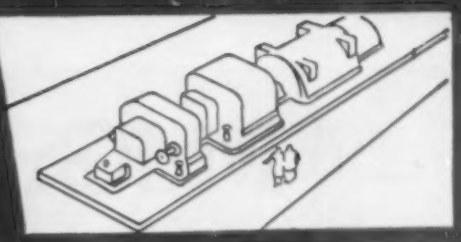

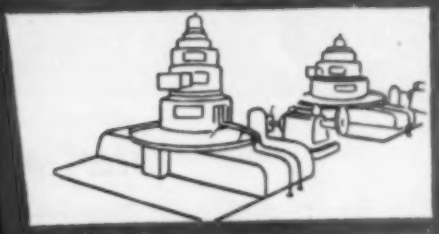

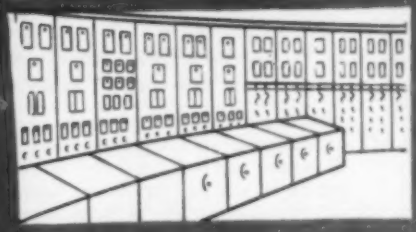

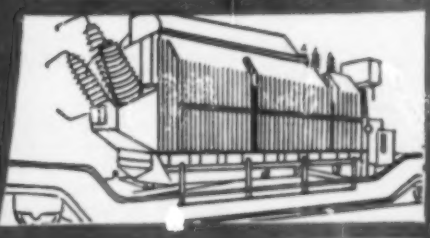

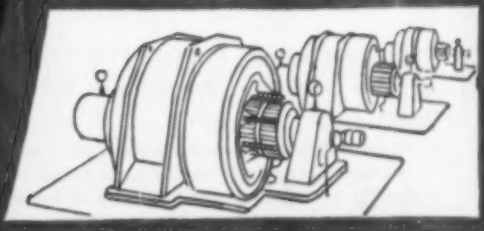

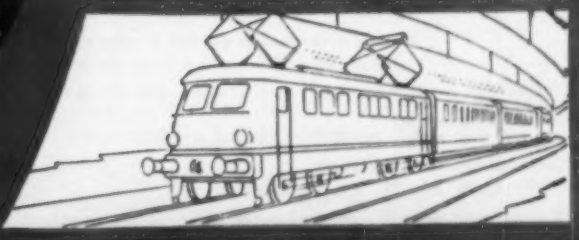

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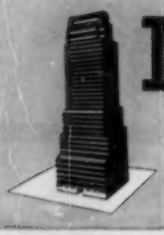

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INTERNATIONAL TRENDS

WASHINGTON—You can expect U. S. business to make a bigger effort this year to find investment and licensing opportunities abroad. In part, this is the extension of a trend that has more than doubled U. S. private investment overseas since World War II. But there are other factors that serve to step up the search.

Labor costs in the U. S. are rising. And multilateral currency convertibility is still a long way from being a reality. The result: an increasing number of manufacturers, who wish to market their products abroad in competition with Western Europe and Japan, are seeking production bases in the so-called under-developed countries.

Such investment is far from being exploitation. To the contrary, of the estimated $1.5-billion that was invested abroad in 1954, $750-million consisted of profits that were plowed back into foreign operations.

There are also a number of side benefits, particularly in less developed areas. To name a few: U. S. technicians train local labor, thereby increasing the country's skilled labor pool. Where necessary, hospitals and schools are built, and it is frequently possible to get a large manufacturer to assume all or part of the cost of improving local road and rail transportation.

The U. S. government will assist business during the coming year in its search for investment possibilities. The program will be handled through the Foreign Operations Administration (FOA), which will send out thirty specially trained "investment assistants" who will be responsible for developing new ventures. They will channel information back to the FOA, which will pass the facts on to U. S. business.

If you want one of these investment specialists assigned to your country, suggest that your government request it of your local FOA representative. If no FOA representative is located in your country, your government can write directly to Foreign Operations Administration, 806 Connecticut Ave., N.W., Washington 25, D. C.

LONDON—Steam power, somewhat eclipsed recently by spectacular developments in other fields, may be in for a resurgence, particularly in under-developed areas. A new lightweight engine, invented under a development contract from the British National Research and Development Corp., shows remarkable promise as a low-cost power source.

The engine consists of three readily assembled parts: a furnace measuring about 1 ft. square, a boiler of about 1 ft. by 18 in., and an engine of just over 1 ft. square.

Power output was recently demonstrated by three engines on display. Fed on peat, one of the three engines supplied power to a lathe, a saw, and a grinder simultaneously. A second engine heated water and powered a generator, which in turn provided power for air conditioning and electricity for a small house and a small X-ray unit. A third engine powered a chain saw and a water pump. Mass-produced, the engines will sell for approximately £ 100 ($280).

GENEVA—Swiss technology will save Iraq much of the foreign exchange that it is now spending each year on sugar imports. In an average year, Iraq imports some 80,000 tons of sugar. At the same time, it is faced with an over-production of dates, which have an 81% sugar content.

The paradox became apparent to a Swiss chemistry professor named Mohler, who was familiar with war-time research on the extraction of sugar from fruits. In cooperation with Iraq's National Date Association, he shipped 3 tons of dates to Switzerland where they were treated by a special process to produce a ton of liquid sugar.

The result: Iraq's Date Association is setting up plans for building a date refinery that will use the Swiss process. The new industry will absorb the country's date surplus, cut foreign-exchange expenditures, and raise the population's nutritional level.

NEW YORK—The Chase National Bank will organize a new multi-million dollar corporation to provide medium-term credit for use in financing exports from the U. S. The new organization will work in close cooperation with the Export-Import Bank, which will play an important role in the new firm's financing operations.

To you, this will mean easier credit terms for U. S. goods—in some cases, up to 5 years. To the exporter in the U. S., it represents a long-awaited move on the part of commercial banking to meet the credit facilities available to exporters in other countries, notably Britain, Germany, and Japan.

Consumer items, for the time being at least, will not be eligible for financing under the new plan. Exports will be limited to those that can be generally classified as capital equipment.

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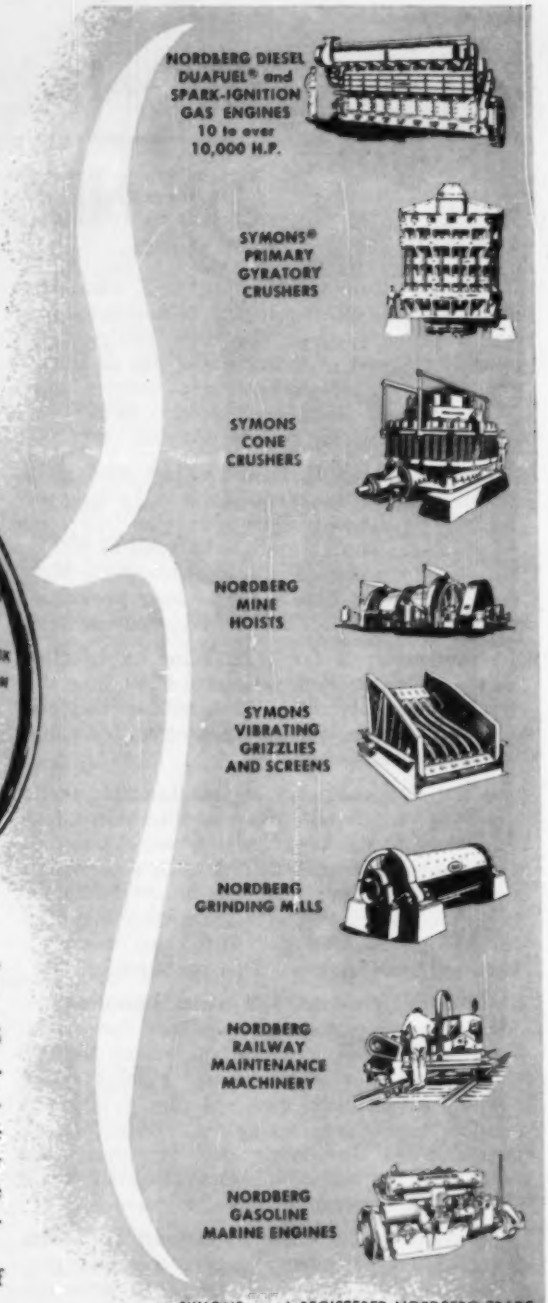
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JANUARY 1955
VOLUME 10 • NUMBER 1

McGRAW-HILL
DIGEST

All over the world, 1955 will be the best year ever for business. Only in Brazil and Japan is the outlook seriously clouded. Dire predictions of the effect of the U. S. recession have proved false. And U. S. economy is still growing (see p4).—An original Digest article

World Outlook for 1955

Europe

Belgium

BRUSSELS—Competition is forcing Belgian industry to modernize. Large-scale re-equipment and mergers will take place throughout industry. Manufacturing, caught short by the drop in export orders, expects to get a lift from this increased domestic plant investment.

Tax concessions will help industry charge off new machinery. But capital is limited. World Bank loan of $50-million will support investment policy. Use of European Payments Union credit balance would release funds for domestic investment. No dollar shortage exists. Franc is close to convertibility.

France

PARIS—French business is optimistic. Internal politics appear to be as stable as can be expected. Most foreign affairs problems are under control. The steel-industry's order books are filling rapidly, and the textile industry is making a steady recovery.

Premier Mendes-France hopes to modernize the French economy through elimination of marginal, high-cost producers. Government officials privately say that industrial production should rise 5 to 7% this year.

Foreign trade and payments were well balanced last year. But talk of devaluation persists despite government denials. Export subsidies and import taxes should boost 1955's exports. Imports are also expected to rise in trade with non-dollar areas.

Germany

BONN—1954 was a record year for the German economy. Steel and automobile production set new highs. Over-all, Germany's gross national product rose nearly 7% last year. This year's outlook is clouded by German rearmament but still will be a good year.

Virtual absence of a capital market will hurt the Federal Republic and defense contributions will be high. But German industry expects the new tax-reform bill to give fresh impetus to the creation of a capital market.

Cost of living and prices will remain fairly stable. A labor shortage may cause trouble in 1955.

Exports and foreign-exchange surpluses should be better balanced. Imports will rise because of trade liberalization.

Italy

ROME—Experts here believe 1955 will see the return of the lira to a freely convertible basis. As usual, Italy closed 1954 with a trade deficit. But balance of international payments and payments to the dollar area show a small surplus. The trend toward trade liberalization will continue during 1955.

Industrial-production index this year will about double the prewar figure. Both manufacturing and chemical industries are likely to improve their competitive positions on the international market. Prices will continue to follow a stable trend but cost of living is headed slightly higher.

Netherlands

AMSTERDAM—Last year was a boom year for Holland. After 1954's 8% rise in industrial production, 1955 should see slight further gains.

The financial situation is sound; the budget is balanced. Taxes on both business and individuals will be reduced 10%. Large gold and foreign-exchange reserves will continue to rise. Foreign-exchange controls will be further relaxed. Holland is prepared to make its currency convertible.

Two wage increases in 1954 and expected increases in 1955 will have an inflationary tendency. Keen competition abroad, higher costs internally should hold down exports. Imports will continue high.

Benelux integration will continue with full economic union probable by next year.

Switzerland

GENEVA—All signs point to another year of high economic activity. The

lone exception is the watch industry. It is already depressed, and the U. S. decision to raise duties on Swiss watches is a further blow.

Foreign trade will continue brisk. The fall in watch exports will likely be made up in higher exports of machinery, chemicals, and pharmaceuticals. Machine-tool order books are filled. But competition is getting keener.

No exchange controls obtain. Public debt is small; capital is abundant with low interest rates.

Turkey

ISTANBUL—Plagued by a foreign-exchange crisis, Turkey nevertheless will continue to boom. Public-works program is planned this year with emphasis on utilities. Industrial expansion will continue. The favorable climate for foreign investors set up by the government will bring in new industry and may offset lack of foreign exchange. Imports will be further restricted in an attempt to conserve foreign exchange.

United Kingdom

LONDON—Keys to Britain's outlook are (1) World War II destruction is largely replaced and (2) the pound sterling is steadily being strengthened. Britain now is on the verge of expanding and modernizing her production in much the same way as the U. S. in 1946. But Britain will go slower and make no use of deficit financing as did the U. S.

Convertibility will be approached in slow but steady steps. Timing of each step will bring maximum advantage to Britain. Invisible trade continues to more than make up for the normal trade deficit. And gold-dollar reserves should approach $3-billion this year.

Industrial production is steadily rising. Steel making, metalworking and vehicles show greatest vitality. Cost of living is headed slightly up. But the British worker will get some tax relief.

Latin America

Argentina

BUENOS AIRES—The country is gradually returning to normality in an economic sense. New industries are coming into being. Production index, getting back to its 1951 level last year, will go still higher in 1955. Wage increases last year boosted prices substantially. At year-end, supplies about matched demand. This situation should hold throughout the year, thus stabilizing prices.

Tight controls will conserve foreign exchange. Imports of raw materials and industrial machinery will get preference with certain consumer goods allowed. Argentina will continue to export its agricultural surpluses under bilateral agreements and barter deals.

Brazil

SAO PAULO—All signs point to a rugged year for the Brazilian economy. Power shortages, restrictions on production-raising imports, and Brazil's labor laws will prevent any rise in production.

Coffee production will be high—too high to maintain last-year's prices. Dollars will have to go for foodstuffs even though Brazil produces all the food it needs. Inadequate transportation and storage facilities are to blame.

Increased taxes may cut into the Cr 15-billion deficit. And so may cuts in the budgets of autonomous government agencies. But more new money will be circulated.

Cost of living will continue to skyrocket. Imports will cost more. And finally the political situation is unstable.

Chile

SANTIAGO—The price and quantity of copper exports and inflation are the keys to Chile's economy. Nearly 40% of Chile's foreign exchange and 60% of its dollars come from copper. A program is underway to diversify exports and reduce dependence on copper. But it has brought another evil: inflation. The government is combating inflation by cutting its expenses, limiting money issues, and controlling bank credits.

A new law facilitates foreign-capital investments. That should help industrial production. Chile has devalued its peso from 110 to 200 to the dollar for purchases from the dollar area.

Colombia

BOGOTA—Little change in Colombia's economy is expected this year. Production is expected to hold its place. Some prices may rise because of import restrictions.

Foreign-exchange position is precarious. Drop in coffee sales has cut dollar income so the country is making remittances only as dollars become available. Devaluation of the peso is a possibility. Cuts in government spending should help Colombia meet its budget needs. But a vast hydroelectric project in Valle del Cauca is being planned.

Mexico

MEXICO CITY—Still shaken by the 40% peso devaluation last April, the Mexican economy is slowly regaining its feet. Prospects for 1955 look good. Devaluation did not close the dollar gap, but invisible trade (U. S. tourists) made up the difference.

A record cotton crop brought in close to $200-million. Coffee showed good results. And petroleum production increased.

Mexico's government made two important foreign-policy decisions: (1) it will give guarantees designed to draw foreign investment, (2) it will continue to base its economy upon free monetary exchange. Import controls will conserve dollars.

Uruguay

MONTEVIDEO—Balanced income and expenses will keep Uruguay's economy stable this year. Exports will continue to offset imports. Import controls will continue to operate.

Agricultural and industrial production will parallel that of last year—no significant increases are expected. Industry should expand somewhat because of increased demand through better living standards and because of domestic savings and increased available capital. Little change in prices and the cost of living are expected.

Early this year Uruguay will hold a national election. But again, no radical changes are to be expected.

Venezuela

CARACAS—As long as the world market remains open for its oil, Venezuela will continue to boom. Sound currency, backed by tremendous oil reserves and minerals, mark the country as having a bright present and still brighter future. For foreign investors, money can be made.

The vast public-works program is one of the most ambitious in the world. Highways, railroads, hospitals, low-cost housing are all planned or underway.

Within 5 years, the country should be able to feed itself if the strides made in the last 5 years continue. Prices and wages are high.

Asia

India

BOMBAY—Business looks the best since early postwar. National Planning Commission based its first 5-year plan (1951-56) on agriculture with industrial emphasis on state enterprises. Now NPC will give business a chance. Reason for the switch: public and private investors failed to hit their plan targets.

Food production is at an all-time high and going higher. Industry is worse off. Better government cooperation will improve this situation. In her race against overpopulation and under-employment, India may hold her own.

Japan

TOKYO—Depression is threatening Japan. It has too little food for too many people. Its exports cannot finance additional food imports. Surplus farm commodities from the U. S. ($100-million worth) will go a long way toward solving this dilemma. Also trade negotiations with the U. S. lead toward a better dollar position for Japan.

Industrial production will fall this year and with it national income. Prices have dropped about as much as can be expected—9% since last February. Unemployment will become a serious problem. Already better than 14% of the total labor force are unemployed.

Foreign-exchange position will not deteriorate further. Government will restrict non-essential imports and try to boost exports. The trouble with Japan's export picture lies in the fact that Southeast Asia no longer depends solely on Japanese imports. And competition is on the increase.

Philippines

MANILA—Revision of the Bell trade act, Japanese reparations, and nationalization of retail trade are the three factors most likely to influence the Philippine economy this year.

A selective tariff will keep the Philippines in a favored position with regard to agricultural exports to the U. S. Repeal of another feature of the Bell trade act, which gives equal rights to Filipinos and Americans in exploiting natural resources and operation of public utilities, is also asked. Japanese reparations will be made in goods and services.

Industrial and agricultural production will continue its steady rise. Living costs and prices will remain steady. Gold and dollar reserves will hold steady at about $300-million.

Africa

Egypt

CAIRO—Anglo-Egyptian agreement on the future of the Suez Canal dominates the outlook for 1955. Trade between the two countries will return to normal with an increase in business confidence. Egypt hopes to sell more cotton to Britain and buy more British goods.

More local capital is moving into commerce and industry. In past years, investment emphasis has been on agriculture and real estate. Cost of living seems to be stabilizing and restrictions on imports may be eased because of the improved foreign-exchange position.

Union of South Africa

JOHANNESBURG—The Union's prospects for the coming year are bright. Import controls, long a damper on expansion, will be sharply reduced this year; may be abolished entirely by 1956.

Continuing demand for gold and uranium support a strong foreign-exchange position (total reserves as of last October: $350-million). Sales of the two minerals in 1955 may top $600-million.

Industrial and agricultural production continue at high levels. Output will be stimulated by relaxed import controls but may be held down by a continuing transportation bottleneck.

Present indicators point to stabilization of living costs. Here again, competition from imports will help to drive costs down.

Australia

MELBOURNE — Despite production increases, Australia's export income will drop $150-million in the year ending June 30. Wool and wheat prices are lower, and capacity to produce for export has not kept abreast of capacity to meet domestic demand.

Present contraction in monetary reserves and money supply is not expected to cause a setback similar to the 1951-52 crisis. But Australia continues to live ahead of income at the expense of reserves. Prices may turn upward later this year. Some industries may seek protection.

Price of wool is basic to the economy. In terms of Australian currency, it brings in six times as much as prewar. Other export commodities earn only four times as much on an average. So over-all favorable terms of trade owe much to the high price of wool. Should it drop to parity with other commodities, a drastic overhaul of currency, trade, and industrial policies would be inevitable.

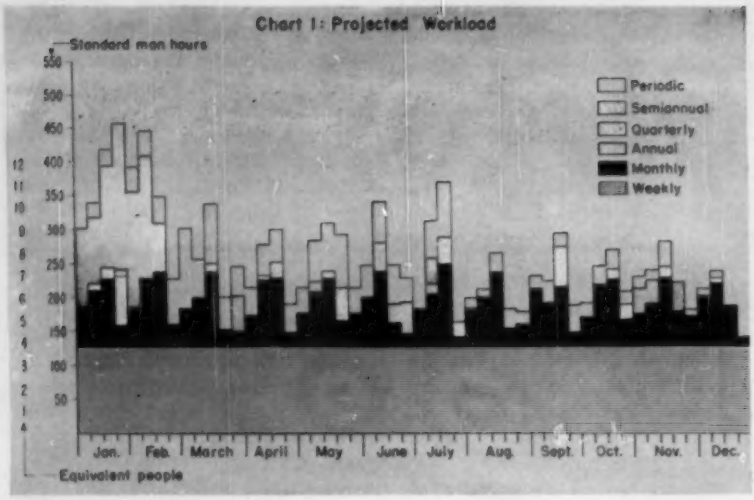
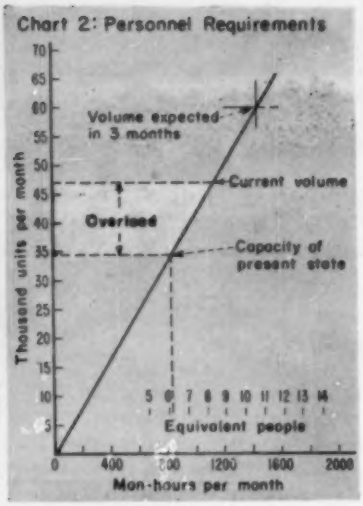


CHART PROJECTS workload for one year. No peaks or valleys occur in weekly work, but in annual, quarterly, and similar work, highs and lows are evident. Chart shows man-hours and manpower needed to handle workload.



PRESENT STAFF works overtime to handle current volume. In 3 months, workload will require ten people.

Planned Work Sets Office Pace

Standard time data are essential to any work-measurement program. Applied to office clerical problems, time data smooth office functioning

A WORK-MEASUREMENT PROGRAM can allow you to plan your office workload in advance and show you where economies lie. But you can't have an effective program without reliable standard time data. These steps form a guide in standard time-data development:

1. Getting down on paper what functions or jobs the section is responsible for.

2. Outlining step by step the way each job is processed through the section.

3. Determining the amount of time each step should take.

4. Determining the amount or frequency of each step in the procedure.

Step 1. Make a list of short descriptive statements covering all the jobs or major items of work assigned to the group. The number and variety of jobs or functions assigned to a particular group will depend on the size and type of company and the way it is organized. It is not the volume of work but the variety that must be considered in setting up a schedule for a work-measurement study.

Step 2. Outline all jobs. Each job is taken separately; with the assistance of the people doing the work, a comprehensive picture of the entire operation is made, including all the variations that can be expected to occur. A procedure flow chart will do a good job. It follows the "raw material" from the time it enters the section until it is completely processed.

The chart can be made by drawing a line to indicate the work flow, and, by its side, showing a running account of every operation performed by an employee. Symbols can indicate the general nature of each operation. Usually the operations fall into five categories: receiving, delivering, examining, taking action, and filing. The completed procedure chart gives a detailed account of every essential operation involved in processing the particular item of work through the section.

Step 3. Determine the time it should take to do the work, placing a fair and reasonable value in terms of man-hours on each operation described in the charts. The most dependable and fairest values are obtained by splitting up a clerical action into its component parts and timing each part, or element, separately as it is done by the individual assigned regularly to the task.

The total time, after it is adjusted to allow for personal needs and the effect of fatigue, becomes the standard unit-time value for the operation. The measurement process is followed for each recorded step of the procedure until all operations outlined on the chart have been measured.

Sound principles must be laid down and followed if the data developed is to have the kind of value it should have in the control of office expense. These principles should always include: (1) the adoption of a sound method for setting standards, (2) the guarantee that no standards will be changed without making changes in procedures, methods, equipment, or materials, and (3) a demonstration of faith and confidence on the part of management in the standards and the measurement program.

One advantage of standard time data is the picture they give of the workload. Planning or budgeting man-hours requires that two things be known: (1) how much work there is to do and (2) when

it is supposed to be done.

Step 4. The workload illustrated in Chart 1 represents the work of an accounting group with a greater variety of tasks than is found in most clerical sections. The diagram points out several things. It shows how many standard man-hours of work is expected in each of the 52 weeks in 1955. Also, it shows how the workload is broken down into its frequency pattern.

The scale on the left converts standard man-hours into the number of people required to handle the work. For any given week during the year, the required staff is known in advance and definite plans can be made to have the people available.

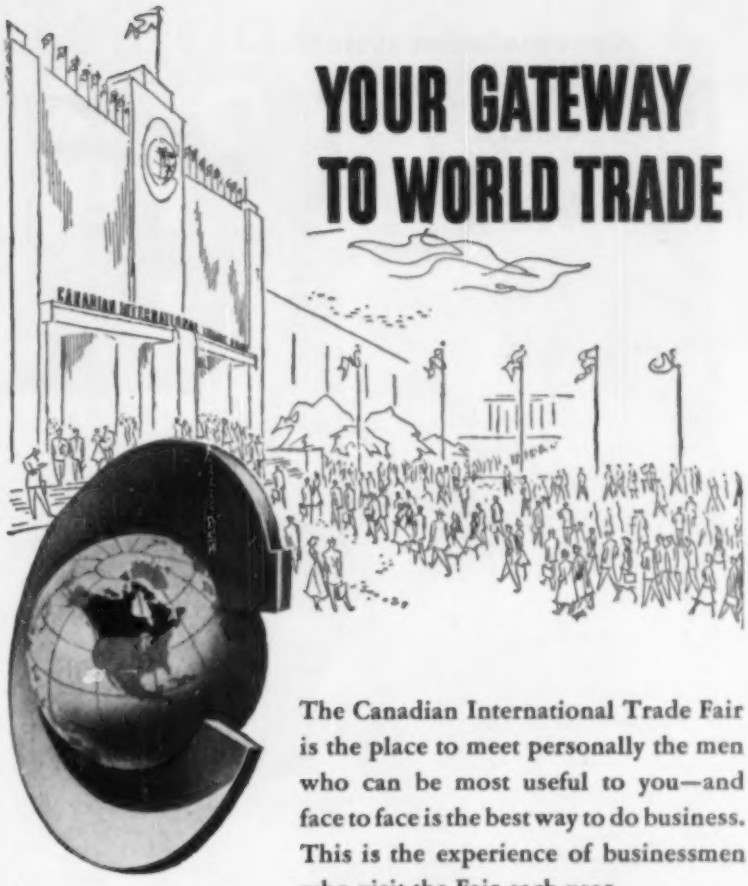
Information such as this shows the extent and location of minimum and peak loads. It is helpful to the office manager in planning the distribution of his clerical force weeks in advance. Similar workload projections can be made of any group when standards are set and the approximate amount of work to be done is known.

Problems posed by a prospective increase in the volume of work can often be pointed up if standards are used to diagram the problem. In most cases, when an increase in business is expected, it is necessary to know: (1) the capacity of the present staff, (2) the current volume of work, and (3) the prospective increase in the workload.

Personnelwise, there are two problems. (See Chart 2.) The immediate one is the need to obtain additional help to handle the present overload (shaded area on chart). Failure to take care of this situation could result in a number of undesirable conditions. For instance, a large backlog might be built up or overtime might be necessary day after day; or service to the customer might suffer.

The other problem, that of planning for the expected increase, is also well defined. Knowing how much more work can be expected, and when it is due, makes possible the preparation of definite plans well in advance to take care of this increase.—Am Business, Oct, p16

COVER shows one phase of office routine. Filing is simplified by Remington Rand Safe-File Desk.



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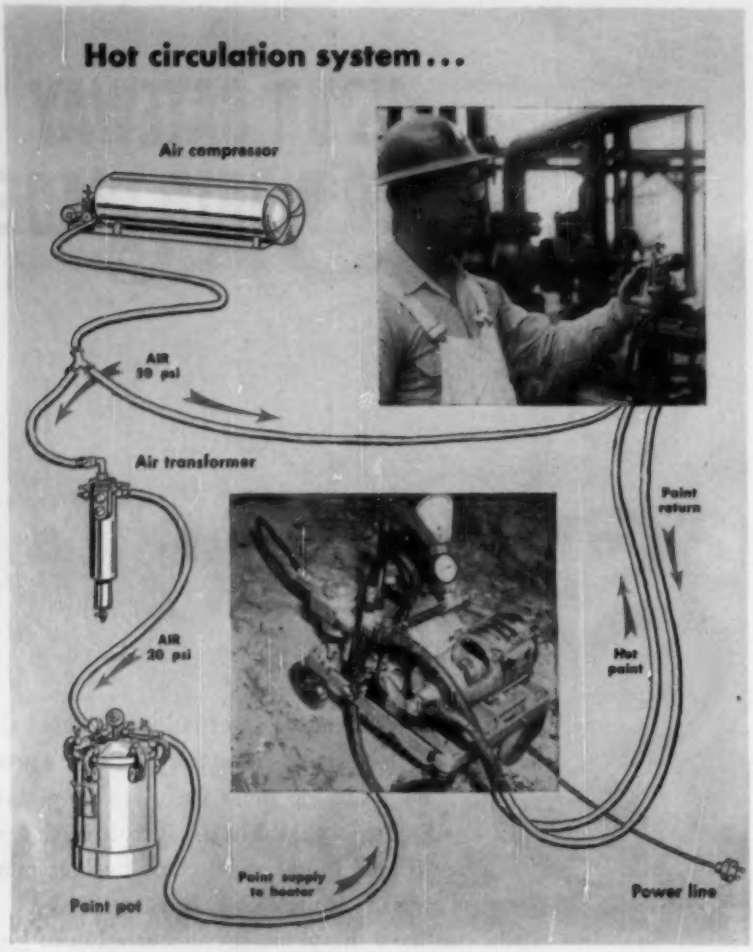


Hot-Sprays Vinyl Paints in One Coat

Vinyl paints for preventive maintenance are not new, but hot spraying is. Chief objection to vinyls was number of coats needed to build up to necessary thickness (0.005 in.). So Carbide & Carbon Chemicals Co. (Union Carbide & Carbon) developed a hot circulation system to keep paint at 160°F. Coating thickness is 3 mils instead of previous ¼ to 1 mil for cold paint. Air from compressor passes through transformer to paint pot. Paint flows to heater, then is delivered to gun. Paint recirculates when not being sprayed. Other advantages: lower painting costs, better finish, less overspray, and satisfactory coating on small surfaces with numerous projections as well as on large surfaces.—Chem Wk, Oct 23, p46

Nitrogen Arc Welding

Nitrogen as the shielding gas in shielded-arc welding has been investigated in Europe as helium is not available there and argon is quite expensive. To date, most of the nitrogen welding has been confined to deoxidized copper. Lead, tin, and zinc, as well as copper, can probably be welded with nitrogen as it is insoluble in these metals at normal welding temperatures.

Most success has been obtained by using thoriated tungsten electrodes and high arc voltages (about 30% greater than with argon). The result has been satisfactory welds with gas cost below that for the rarer gases.

Nitrogen alone appears unsuitable for mild steel because of its solubility and consequent effects caused in the steel. A General Motors plant (Kansas City), however, reports successful experimental welds on low-carbon steel with a nitrogen-helium mixture.—Weld Eng, Nov, p43

Direct Generator Drive For Railroad Cabooses

A new drive for railroad-caboose generators is being produced by the Spicer Manufacturing Div. of the Dana Corp. (Toledo, Ohio). The drive is designed to connect with the end of the axle rather than being mounted on the large center section, thereby permitting connection either in the vertical plane with a generator inside the car or horizontally with a power unit underneath.

Other advantages of the unit: It is not necessary to work on the drive or generator under the car. Where replacement is required, it is not necessary to remove a wheel or check alignment. No torque arm mounting is required and no safety arm is needed. Small drives are interchangeable for all sizes of axles and need no axle mounting. Similarly, the center section of the axle need not be machined.—Railway Loc & Cars, Nov, p67

Preventive Engineering Cuts Maintenance Costs

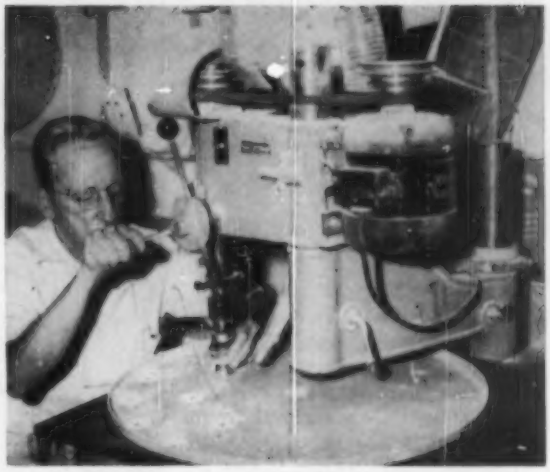
Monsanto Chemical Co. has found that preventive engineering has cut its maintenance costs. Basically, Monsanto believes preventive engineering means having enough trained engineers in its maintenance organization to enable each one to use his talents to best advantage. The engineer's job is to engineer equipment to reduce either the need for maintenance or the cost of repairs when they occur.

The company set up its program this way. It gradually bolstered its staff with graduate engineers. It separated the maintenance engineering from the crafts supervision function—and any other involvements of the plant engineering group.

Monsanto continually stresses the engineer's responsibility for reducing manufacturing costs by (1) reducing the need for maintenance, (2) decreasing mechanical downtime, (3) improving equipment performance. And the company gives the engineer every tool he needs to do the job right.—Factory, Nov, p104

New Ideas Tell How To . . .

. . . beat the dust problem



Fabricating reinforced-plastics sheet is raising a dust-hazard problem. Fine dust particles irritate operators' skin and cause personnel problems. These precautions can eliminate objections:

1. Some operators are temporarily sensitive to the dust—about a week is needed for adjustment.
2. Cleanliness cuts down the hazard.
3. Emphasis should be placed on the fact that there is nothing toxic or harmful in the materials.
4. Protective "creams" are helpful.
5. Vacuum exhaust systems can carry away dust around machine operations.
6. Dust can be prevented from being carried into assembly operations by dip washing parts in liquid wax and solvent.—Mod Plastics, Nov, p129

. . . make research more valuable

One way is to simulate in the laboratory actual conditions in practice. Carter Oil Co. has done this in its new laboratory by compressing an oil field, 100 miles square and 6,000 ft. deep, into one room, 15 ft. square and 12 ft. deep.

In this room, the researcher can simulate type of rock structure, fluid pressures, rate of flow, and various injection patterns. Here he sets up a flooding pattern. In another part of the laboratory, a 50-ft. high drilling-research tower permits testing new types of drilling tools.—Oil & Gas J, Nov 1, p62

. . . provide mobile power

A portable electric power converter permits operation of electric power tools wherever a vehicle can be taken. The conversion unit is plugged into a polarized receptacle connected to the battery terminal, and the 110-volt portable tool is plugged into the converter.

The conversion unit is rated at 750 watts and consists of an inverter autotransformer and a rectifier in the output circuit. The converter is not unduly fragile and is light enough to be carried easily. Future applications will include agricultural as well as industrial uses.—Elec World, Oct 18, p156

Follow These Tips for Power-Brush Selection

Power brushing cleans surfaces, removes sharp edges, and reduces stress concentrations on machine parts by removing scratches, tiny cracks, tool marks. The brush for a specific job should be picked on the basis of the machine to be used, type of work, properties of the work material, speed, and other work conditions. Here are tips to follow, according to the available type of brush:

Cord or fabric—fast-cutting, medium-flexible wheels. Use with cut or color buffing compounds for producing low-microinch finish. Major uses are buffing, surface blending, light scale removal from metal surfaces.

Tampico and treated fibers—flexible, fast-cutting wheels. Use with burring compounds of tacky composition for producing fine finish. Major uses are small burr removal, producing radii, light scale removal.

Fine wire—wire dia. 0.008 in. or smaller. Major uses are medium burr removal, light scale removal, satin finishing.

Wire—wide face, dense fill for fast cutting and fine finishes. Major uses are heavy burr removal, producing radii, rust removal.

Wire sections—narrow face, medium density, good flexibility to follow contours. Major uses are cleaning, medium scale removal, rust removal.

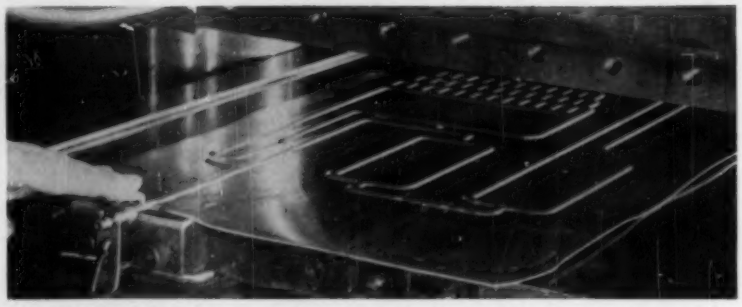
Coiled-knot sections—narrow face, low density, high flexibility, good surface impact action. Major uses are heavy scale removal, rust removal, satin finishing. — Am Mach, Oct 25, p167

Trend in Office Buildings

More and more new office buildings are adopting automatic elevators and electric stairways as the latest developments in office-building transportation. Automatic elevators have two major advantages: (1) they reduce labor cost and (2) they provide quicker service.

Electronics control the new elevators. No operator is needed. The building is divided into zones. If traffic becomes heavy in one zone and light in another, cars are automatically shifted to the zone where they are needed. This is done much faster than a human starter could do it.

An electric stairway handles large traffic volumes at a lower cost than elevators can offer. But it's limited by the number of stories in a building—about seven floors are considered maximum. Peak load should be more than 1,500 passengers an hour.—Am Business, Oct, p20



A NEEDLE inserted into two fused sheets of metal at the end of a complex tube pattern carries air under high pressure to complete a . . .

Dynamite Forms Fan Hub

Forming a Monel-metal fan hub into a truncated sphere was a tough problem solved by means of dynamite at Moore Co., Marceline, Missouri.

Two sheets are welded into cylinders, one fitting closely inside the other. The assembly is placed in a heavy laminated die, water is added, a stick of dynamite is suspended at the surface of the water, and a heavy cover is laid over the die. When the dynamite is exploded, the Monel cylinders are formed to the die contour. Cost is only 15% of that for spinning.—Am Mach, Oct 25, p173

Process That Puts Tubes Into Sheets of Metal

A process for producing a homogeneous sheet of metal with built-in tubing has been unveiled by Olin Mathieson Chemical Corp. (East Alton, Ill.)

The tubed sheet starts as two sheets of metal. A stencil-like pattern is then placed over the face of one of the sheets and a special stop-weld substance is painted over the pattern with a rubber roller. The two sheets are placed face-to-face and the edges welded to prevent their slipping out of position.

Sheets are then heated and rolled, during which process they bond together, becoming a single sheet except at those points where the metal is covered by the stop-weld substance. The final step in bonding is an annealing process that fuses the two sheets.

The sheet is then trimmed at the end, exposing the lead-in end of the stop-weld pattern. A needle is inserted into the sheet at this point and pressure is blown through the needle to form the tubing.—Business Wk, Oct 30, p96

1 SCOOP TRUCK proves versatile time saver in handling material from railroad car to storage.

2 SHUTTLE CONVEYOR, on a movable carriage, distributes materials to proper storage bins.

Bulk Handling Mechanized

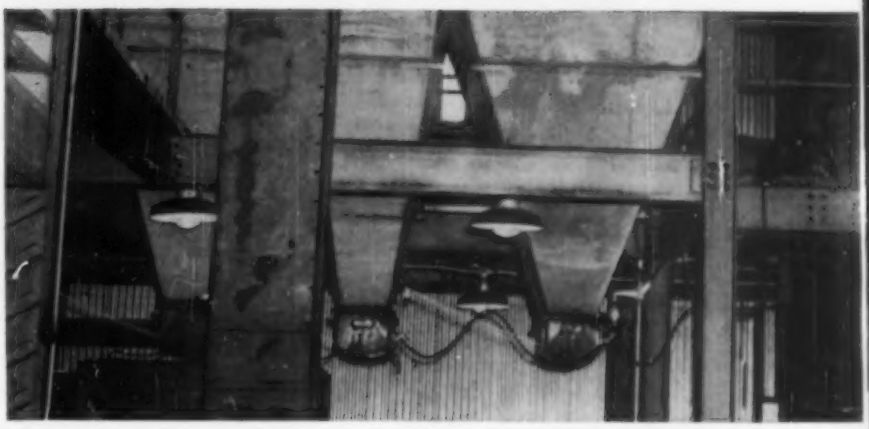
IF YOU HANDLE bulk materials in your plant, it might pay you to compare your handling methods to those of Carstens Packing Co. (Tacoma, Wash.). Carstens handles chemicals in its new $180,000 fertilizer plant, but its methods would give many of the benefits in other bulk handling.

Carstens has doubled output with a force of five men, compared with 12 men in its old plant. Bulk materials were shoveled by hand, wheeled in buggies, weighed on platform scales—all manhandling.

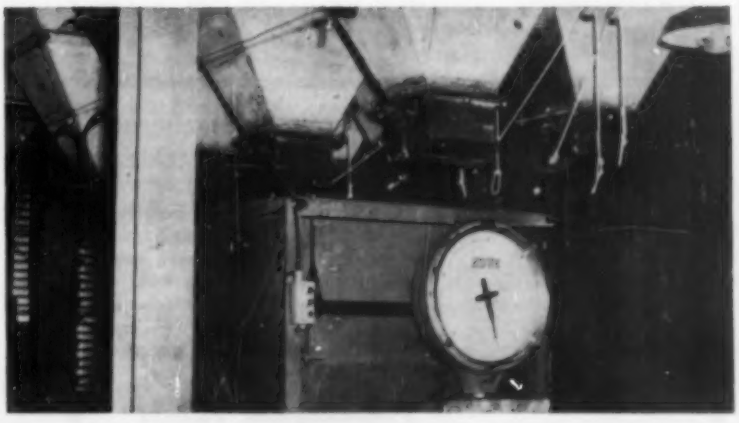
In the new plant, a scoop truck moves bulk chemicals, in 600-lb. bites, from railroad cars to a screw-feed elevator that carries them to an upper level of the building. A belt conveyor carries materials the length of the building; a shuttle conveyor distributes them to storage bins.

The scoop truck moves chemicals from storage to an 8-bin, 15-ton hopper in the processing area. A 1-ton, rail-mounted weighing lorry measures out batch quantities and delivers them to a bucket elevator feeding a batch mixer. Blended chemicals discharge into a hopper in the packaging section.

With scoop truck, conveyors, and automatic baggers handling the materials, labor requirements have been reduced from 1.6 to 0.33 man-hr. per ton of finished fertilizer.—Chem Wk, Oct 30, p62



3 HOPPER BINS supplied by scoop truck from storage provide intermediate storage. Materials feed from hopper bins to a . . .



4 WEIGHING LORRY that weighs and delivers them to mixer. One man does weighing more accurately than three men in old hand-weighing system.

How much money do you lose in your accounting department?

This question may surprise you, but just think back to how your accounting department grew. A book or ledger at a time. Now and then a new form . . . or file . . . or business machine. Stopgap measures like this may solve the problem at hand, but – in the long run – they take a heavy toll in efficiency and economy. It's like having a hole in your pocket – only costlier, harder to find, and harder to mend.

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Fixed Bonds, Scrap Cable Save Mine $5,000 Yearly

Salvaging and repairing broken bonds and making temporary bonds from scrap trailing cable and permanent ones from 4/0 cable has resulted in $5,000 yearly savings at Vesta No. 5 coal mine of Jones & Laughlin Steel Co. No damaged bonds are considered as scrap until they have been inspected. Sections of damaged trailing cable serve as stockpile for making temporary bonds.

Where new weld-type bonds are needed for permanent installations, they are fabricated from 61-strand 4/0 cable and special sleeves. Vesta splices feeder and trailing cables with the Cadweld process. The process also reclaims bonds that are damaged. By cutting off the damaged ends of two bonds and joining them by the copper-welding process, a bond as good as new could be made. Scrap trailing cable makes either wedge-type or weld-type bonds for secondary track.

The only cost involved is that for labor and materials. Materials costs are low.—Coal Age, Nov, p94

New Compound Makes Durable Shrinkproofing

A new shrinkproofing compound, CET, follows the recent trend toward the development of materials that combine with cellulose rather than those that resinfy within the fiber. Properly applied to suitable fabrics, it will stabilize fabric to less than 2% shrinkage through an indefinite number of washings. Preliminary experience indicates good crease recoverability.

Because this product has little effect on the hand of the fabric, the finisher can produce many variations by adding other resins or softeners to the finishing formula. Its solubility and simple formulations permit easy application.

The cloth should be neutral or slightly acid. Conventional finishing equipment is suitable for application. CET is made by Onyx Oil & Chemical Co. (Jersey City, N. J.).—Textile World, Nov, p180

Tests for Employees Cut Losses from Theft

Industrial uses are expanding the market for electronic devices designed to detect deception. In cases where petty theft is a problem or may become one, managements are beginning to incorporate lie-detector or polygraph tests into their normal preliminary screening of job applicants.

The best known instrument for this purpose is the Keeler polygraph, sold by Associated Research, Inc. (Chicago, Ill.) It uses five tubes and has three separate channels for recording breathing, pulse rate, and skin resistance during carefully planned questioning.

Interpretation of results is the most important factor in the accuracy of lie-detector tests. Operators must be trained to phrase relevant and neutral questions for each particular situation and to interpret resulting chart deviations even when a recalcitrant suspect deliberately lies to every question.

On the technical side, there remains the possibility of greater accuracy through greater sensitivity. One proposal has already been advanced, recommending measurement of blood volume, pulse wave velocity through the body, and oxygenation of the blood. These change with emotional stress almost independently of conscious efforts to deceive.—Electronics, Nov, p9

Shoots Down Overhangs

Plagued by loose rock slabs and overhangs, one quarry gets rid of them by shooting them down. A Remington Arms Co. industrial gun does the job. It is built like an artillery piece, weighs 176 lb., and shoots a slug from an 8-gage shell with a "muzzle energy" of 7,475 ft.-lb.

In practice, quarry operators shoot about ten shots at the point where a suspected overhang is attached to the face. If this fails to dislodge the rock or slab, another shot is directed "right on the nose" to drive it back. Failure of the hazard to drop is usually evidence that the rock is secure.—Eng & Min J, Nov, p93

PILASTER-TYPE WALLS produce an attractive effect and support . . .

Largest Prestressed Tank

Slipform construction, prestressing, unique joint details combine to make largest elevated water tank (2-million gal.) a structural and architectural triumph

TWO THINGS distinguish the new prestressed-concrete water tank erected in Dallas, Texas:

- It has the largest capacity of any elevated prestressed concrete tank built to date—2-million gal.
- It has unusual architectural treatment dictated for appearance by location in a residential area.

Tank is supported on a 2-ft.-thick slab resting on four concentric ring walls. The exterior ring wall is fluted to give a pilaster effect. Substructure walls were built simultaneously with slip forms.

Design includes some new features. To reduce vertical moments caused by restraint at the base of the tank wall, the wall is constructed on two rubber pads. These are placed on each side of a standard rubber bulb-type waterstop. This construction eliminates variable effect of friction between the wall and the footing when horizontal prestressing is applied. The result is uniform inward movement of the wall under prestressing and outward movement under filling of water.

The new joint detail reduces bending movements and resulting vertical stresses due to restraint at the bottom and top of the wall. With vertical prestressing in the wall and the tank empty, the maximum stress from bending is only 1 lb. per sq. in. in tension on the inside face of the wall. With the tank full, wall is compressed.

At the top of the wall, the dome and dome ring rest on another rubber pad. Design was by Preload Co. (New York).—Eng News-Rec, Oct 28, p24

Testing for Defects in Polyethylene Welds

Many large, conplicated polythylene structures are being fabricated by hot-gas welding techniques. Just as in steel welding, welds in polyethylene must be inspected for defects. Most common defects are:

- Insufficient fusion because of low operating temperature or too high a welding rate may lead to poor bonding.
- Air may be included in the weld if the filler rod is laid carelessly.
- Failure to fill an undercut completely.

Simplest method for detecting poor bonding is to allow a short section of filler rod extend beyond the weld. Any attempt to pull off the filler rod should result in a tear at the end of the weld. A poorly made weld will allow the rod to be pulled out of its bed.

An inspection light held at oblique angles to the weld shows air inclusions. But this method is satisfactory only when the polyethylene is not pigmented.

A high-frequency, high-voltage spark-coil tester will find minute pores and cracks. This method works well with tank liner welds.

Small enclosable structures can be tested by dipping them in water after they have been pressurized. Leaks can be detected by escaping air bubbles.

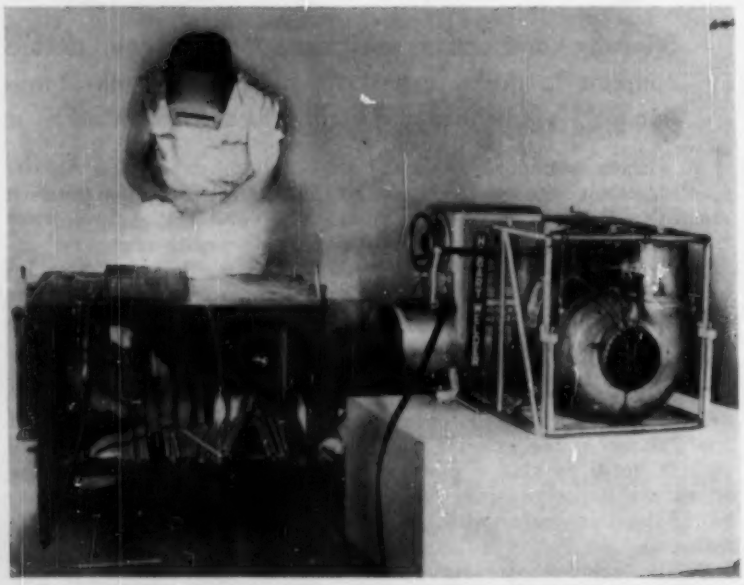
The most efficient method for locating defects in plastic welds is X-ray photography. Failure to achieve complete penetration is readily evident.—Mod Plastics, Oct, p150

New High-Heat Plastic

Recently developed plastic can withstand high temperatures better than aluminum or magnesium. It is a laminate made with glass cloth and three different resins—maleic acid, triallyl cyanurate, and diallyl bicycloheptene dicarboxylate.

The manufacturer, Naugatuck Chemical Div. of U. S. Rubber Co., claims that the plastic can withstand a temperature of 500°F. for 3 days. After that period, it can resist a bending force of 30,200 lb. per sq. in.

Suggested uses include ducts for hot gases, high-temperature molds and dies, and aircraft parts.—Prod Eng, Nov, p202



Small Turbine Powers Arc Welder

What may be the first arc welder to be powered by a gas turbine is being given a tryout by the research division of Hobart Brothers (Troy, Ohio). Not yet a commercial venture, the 250-amp. capacity direct-current welding generator has been successfully operated and tested under actual working conditions found in the shop.—Bus Trans, Nov, p72

Lock-Stave Wood Piping Carries Corrosives Safely

Adaptability, economy, and proved service life make wood the logical material for many piping jobs. This is particularly true where corrosive materials, such as pulp-mill waste liquor, must be handled.

Douglas fir, pressure treated with creosote, has proved the best solution for one company for these reasons: it (1) has strength to resist pressures; (2) lasts indefinitely without pitting, scaling, or tuberculation; (3) has high acid-resistance, and (4) has the resilience and flexibility to conform to normal curvatures common to river-bed installation.

Brooks Lumber Co. (Bellingham, Wash.) made wood piping for a river crossing this way: Pipe was assembled from prefabricated staves and hoops. Concrete ballast rings were placed between hoops to sink pipe and hold it in place on river bed. Pipe staves had two notches into which hoops fit, and staves were alternately spliced at hoop points, thus double locking each stave into place.

Glue used was waterproof Cascophene resorcinol resin made by Borden Co. When tested, the pipe had an outward-pressure strength of 78,000 lb. When tested to destruction, almost all breakage was in the wood and very little in the glue line.—Power, Nov, p109

Panel Controls Furnace

Vacuum system for a new 1,000-lb. vacuum-melting furnace at Utica Drop Forge and Tool Corp. is remotely controlled manually from a graphic panel.

The control panel is perched on top of the vacuum chamber at a point most convenient for the operator to observe the melting and casting within the chamber through sight glasses. The operator cannot see the valves and pumps of the vacuum system. So the control panel graphically displays the status of each pump.

Red lines simulating piping link the switches that operate valves on the pumps. Red and green lights show whether or not each pump is operating.—Control Eng, Nov, p56

1955: Longer, Lower, More Hp.

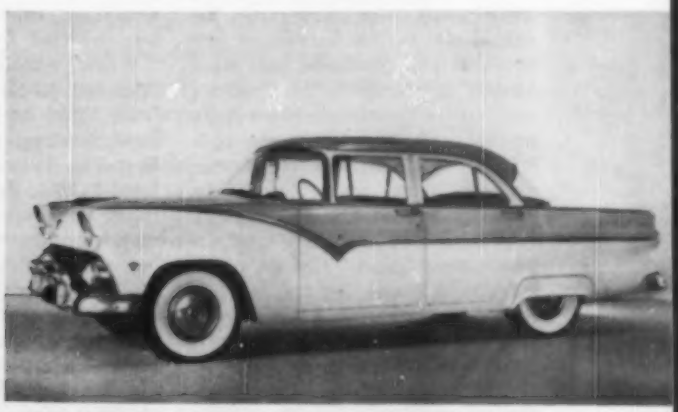
CHEVROLET: Styling follows general lines of 1954's heavier GM models. New engine is a 162-hp. V-8. Six-cylinder engine with 123 hp. remains available.

STUDEBAKER: Three more powerful engines are used in 1955 line. Horsepower ranges from 101 to 175, according to model. New V-8 puts out 175 hp.

IMPERIAL: Car is available as sedan or hardtop coupe. Both have a 130-in. wheelbase and a 250-hp. engine. Imperial is top luxury car of complete Chrysler line.

PLYMOUTH: Over-all length has been increased by 10.7 in. Choice of new V-8 or 6-cylinder engine is optional. Windshield is wrap-around type. Interior is two-tone color.

BUICK: Power has been increased by 54 hp.; now totals 236. Super model shown has new variable pitch Dynaflow transmission that gives effect of gear shift when starting.



FORD: Wrap-around windshields appear on all models. Body has been redesigned with 16 models available.—Am Auto, Nov and Dec.

Explosion Suppressant Makes Flying Safer

A new device developed for the protection of aircraft can snuff out a fuel-system fire in the milliseconds between ignition of a fuel-air mixture and actual explosion. The explosion suppression system, originally developed by the British Royal Aircraft Establishment, is now in production in the U. S.

Simmonds Aerocessories, Inc., (Tarrytown, N. Y.) manufactures the device in the U.S. It includes two basic elements: (1) a sensing element designed to detect an explosion before it reaches destructive proportions and (2) a suppressant fluid capsule that detonates when a circuit from the detector closes. The capsule scatters a mist that blankets the explosion.

The new system is being tested for use in extinguishing fires in engine nacelles, primarily guided-missile power plants. Tests also are under way to combat crash fires.

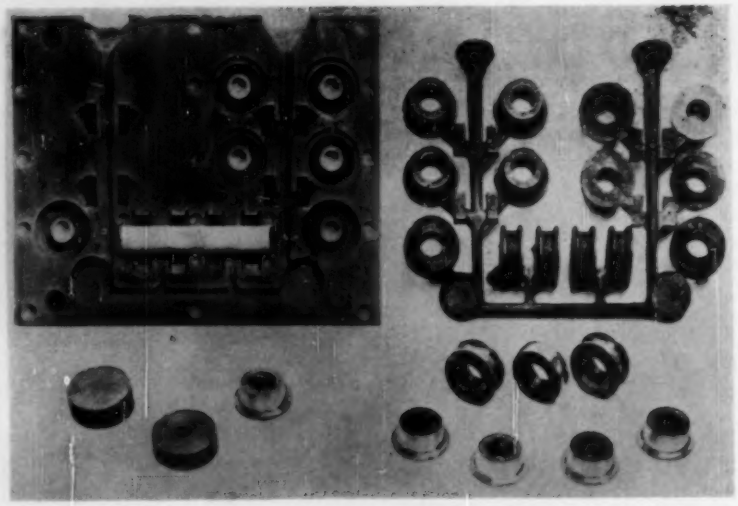
Principal of the system is based on the rate of travel of the carbon-tetrachloride combustion inhibitor from its detonator. The rate (300 ft. per sec.) is faster than the speed of burning hydrocarbons. System uses two types of detectors, visual or pressure-rate-of-rise.—Aviation Wk, Nov 8, p18

Chemical News Abroad

▶ **Germany** is plowing profits in its chemical industry back into research. The industry is spending 5% of gross sales on research. Result is a bountiful harvest of new products and processes that have boosted the country to a strong competitive position in the world's market.—Oct 16, p44

▶ **Brazil** will build a 116,000-ton asphalt plant near Sao Paulo. Capacity will supply the country's requirements and eliminate asphalt importation.—Oct 30, p18

▶ **Japan** is expanding its titanium industry. Production this fiscal year (Apr '54 to March '55) is estimated at 1,200 tons—ten times the output of the previous year. Four new plants are planned to add 85 tons per month.—Chem Wk, Nov 6, p24



COSTS WERE REDUCED by 70 to 77% in shell molding of ejector and oven wheels in small quantities, thereby indicating the economy of . . .

Job-Lot Shell Molding

Regarded by many engineers as a molding method for parts needed in large numbers, shell molding now proves practical for casting job-lot quantities

CASE HISTORIES of actual manufacturing operations are the best basis for judging a process. So Shalco Engrg. Co., a manufacturer of shell-molding machines (Palo Alto, Calif.), switched to shell molding on some of its machine components to check the method's advantages for job-lot casting.

First parts shell-molded were ejector and oven wheels. Pattern and core equipment cost $500 to produce 14 wheels on a 14x18-in. plate. As in most cases, a simple aluminum cope-and-drag pattern was selected for the short runs.

When wheels were machined from bar stock, finished cost was from $2.36 to $2.66 per wheel. Shell molding reduced the cost to 54 to 71¢. Saving per piece ranged from $1.67 to $2.01, or 70 to 77%. If the wheels had been sand-cast, they would have required machining, thereby costing from 70 to 85¢ each; pattern and core box would have cost about $350.

Savings resulted from three factors. First was the elimination of many machining operations. Close tolerances, smooth finish, and many details such as holes and pins could be molded into parts without later machining being necessary.

Second factor was that weight of metal consumed was reduced because of close tolerances. Shell molding can hold production tolerances around 0.005 in. per in.

Third factor was the saving in machining time. Virtually no "skin" effect on shell moldings, and therefore no chilled surface as on other castings, makes machining easier and reduces tool wear. As a rule, surfaces are fully machineable and cuts a few thousandths deep can be made without hitting sand inclusions and blow holes.

Other conclusions drawn from the tests included:

- Shell-molding pattern costs are not as high as generally believed.
- Savings vary widely from piece to piece. The decision to shell-mold a part, other factors being equal, should be based on the cost.
- Chemicals and resin-coated sands, equipment, and techniques have improved to a point where performance can be accurately predicted.—Am Mach, Oct 25, p130

Egypt's New Aswan Dam Will Triple Present Power

Plans for the proposed $600-million High Aswan Dam and hydroelectric project on the Nile River in southern Egypt have been detailed. High Aswan, to be a rockfill dam about 5 miles upstream from the present Aswan Dam, will be second in size only to Grand Coulee in the U.S. Construction will take 10 years.

High Aswan eventually will store 110-million acre ft., develop more than 1-million kw., and provide water to irrigate 2-million acres in Egypt. Power will be delivered 650 miles for irrigation pumping, fertilizer production, and general use. Ultimate capacity of the project will nearly triple Egypt's present total installed capacity.

The project will be financed with money obtained in equal part from local sources in Egypt and groups outside the country. Bonds will be general obligation securities of the Egyptian government.—Eng News-Rec, Oct 28, p39

Titanium Refining

An improved refining process for titanium yields 300- to 400-mesh titanium powder through direct deoxidation of titanium dioxide. It was developed by Japan Metallic Titanium Mfg. Corp. of Tokyo.

The process extracts titanium with metallic calcium. While the basic technique has been tried in the past, cost and residual oxygen have been unsolved problems for commercial production. The Japanese process may have found a way around these troubles. If so, it may prove to be another substitute for the Kroll process.—Mach, Oct 8, p1816

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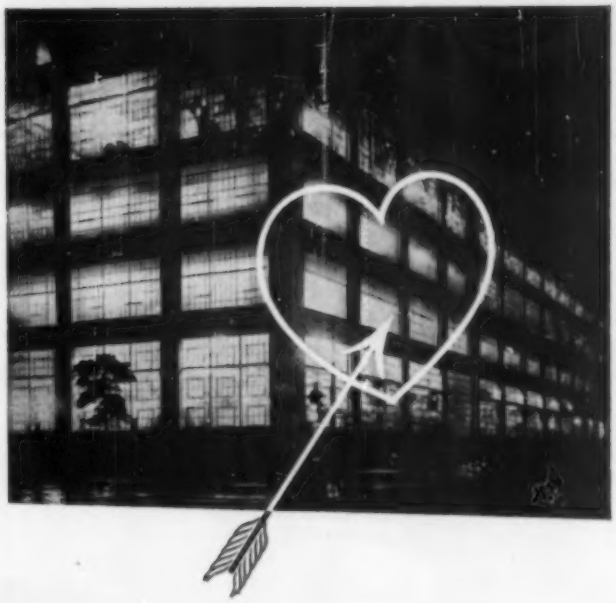
. . . for more information about the ideas covered in Digest articles? It's easy to do. And it will bring you the detailed information you can immediately apply in operating your business. If you have never done so, or if you have and want to speed up the return of such information to you, please read the editor's letter on page 44.



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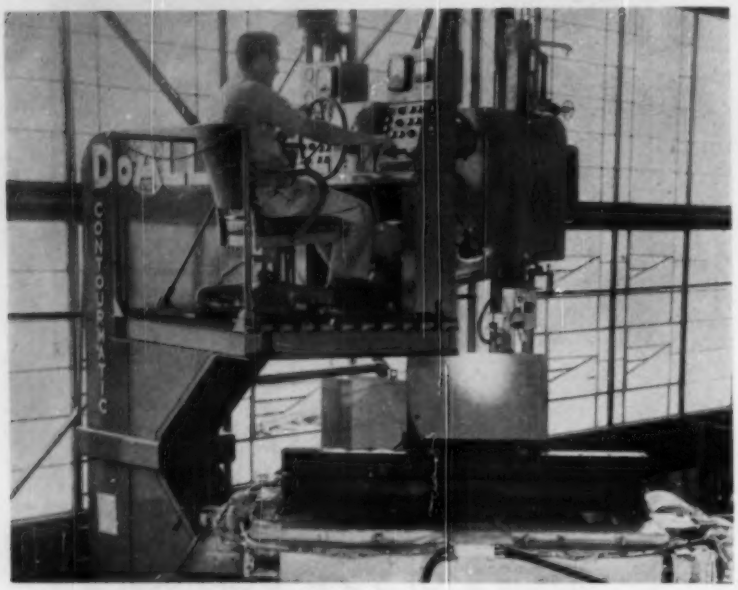
TECHNICAL IDEAS



Huge Band Saw Machines Extrusion Dies

Regarded as the world's largest band saw, this DoAll Contour-matic is machining huge extrusion dies at Aluminum Co. of America's Lafayette plant. The operator, on platform over table, views the work through a periscope as he guides it by electric and hydraulic control to the saw blade. The machine is nearly 16 ft. high, weighs 8 tons, and can handle work up to 26 in. in thickness; working area is 52 x 52 in. After extrusion dies are sawed to approximate shape, they are finished on a die filer, also the world's largest. Finished dies are used on 14,000-ton extrusion press to extrude aluminum shapes for aircraft and guided-missile construction.

Corrugated Piping—Flexibility in tight installations can be gained by use of corrugated piping. Fatigue endurance is less than that of plain pipe, however; under high pressure, there should be careful relief of stress, particularly on corners. Placing piping vertical avoids moisture accumulation at bottom of corrugations.—Power, Nov, p136

Glareless Headlight—A sealed-beam headlight produced by Westinghouse Electric Corp. has a small black shield over the filaments. The shield cuts out reflection-causing glare resulting from reflection of light beams in bad weather. A redesigned lens throws a beam 80 ft. farther than present headlights.—Business Wk, Oct 30, p98

Cowboy Style—Here's a trick that may prevent some nasty hand burns in your plant. Workers at Carter Oil Co.'s Billings refinery carry toy water pistols. In the maze of pipes, one squirt yields a tell-tale sizzle from a hot pipe.—Oil & Gas J, Nov 8, p107

Conductor Tension-stringing—Entire 90-mile stretch of aluminum transmission conductors for 345-kv. operation by the Bonneville Power Administration was done by tension stringing. Job was unusual for two reasons: (1) at no time were lines permitted to touch the ground (this prevented nicks and abrasions that cause corona loss and radio interference); (2) lines were unusually large, 1.602 in. in dia.—Elec West, Sept, p98

Electronic Oil Monitoring—Ultrasonic energy and electronics are used in a new monitoring system for automatic blending of fuel oil. A Bendix Aviation "Ultraviscoson" probe measures the oil's viscosity, transmitting the information to a Minneapolis-Honeywell electronic-control unit that automatically controls the flow of light oil to the mixture (by opening or closing a valve), thus keeping viscosity at the desired level.—Marine Eng, Oct, p132

Dial a Diesel—No one watches diesel locomotives parked on sidings of the Pittsburgh and Lake Erie R. R. Dial-telephone communications system protects them from vandals and keeps them warm in cold weather. When engineer leaves diesel, he plugs it in to a relay box alongside track. This puts it under control of central station. Too hot or too cold engine rings bell. Sound of bell is relayed to station operator who dials code to rectify condition.—Control Eng, Nov, p12

Solves Plumbing Problems—"Twin-mix" adaptor kit permits installation of automatic washers without special plumbing. Made by P & G Supply Co., washer manufacturers provide them for their distributors as accessory kits.—Elec Merch, Oct, p204

Protect Tall Stacks—Ideal targets for lightning, tall stacks are commonly equipped with lightning arrestors. As arrestors are subject to rapid corrosion by stack fumes, International Nickel Co. reduced top-of-stack repair at a nickel refinery by replacing the old arrestor with stainless-steel assembly.—Pet Proc, Nov, p1763

Chemicals from Wool—Australia's government is investigating chemical uses for wool. One is long-chain alcohols from catalytic hydrogenation of wool-wax acids. Newly developed flotation process recovers wool wax from fleece.—Chem Wk, Nov 6, p68

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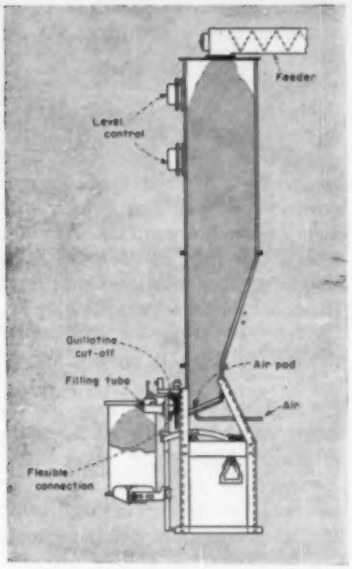


Faster Bagging

Packing multi-wall bags with St. Regis Paper Co.'s new Fluopacker filling and weighing machine is like squirting in liquid through a hose. The solids act like liquids as air at 3 to 4 lb. per sq. in. enters at bottom and fluidizes the powdery or granular solids. Solids are forced out through filling tube to bag. Advantages are greater operating convenience, lower packing and maintenance costs.—Chem Eng, Nov, p298

Moves Houses—Hough Payloaders took on a new job when they moved two small houses 1½ miles. Buildings were supported on beams carried by dolly wheels at one end. Other end of carry beams was supported by Payloader, which also furnished the motive power.—Const Meth & Equip, Nov, p6

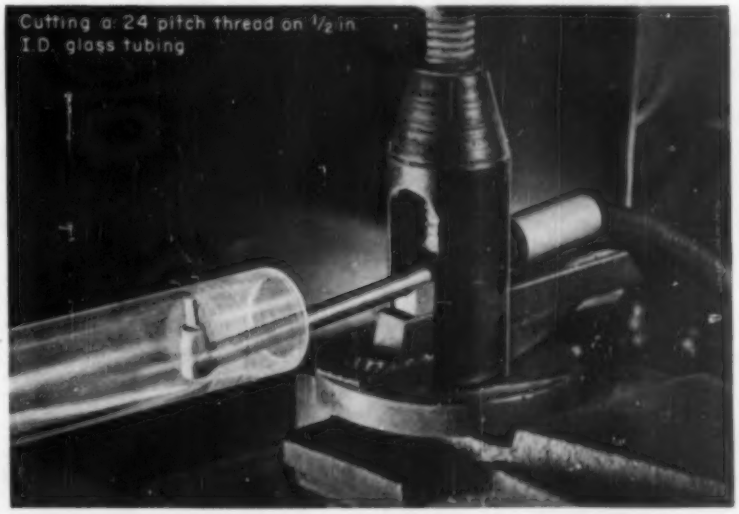
Time Saved—Worthington Corp. cut machining time for one part from 1 hr. to 2.7 min. by replacing sand-cast blanks with continuous-cast bronze bar stock for bushings, bearings, pump sleeves. New material can be machined on automatic bar machine instead of chucking machine. Other advantages: better finish and more consistent structure.—Am Mach, Oct 25, p121

Plastic Building Panels—Press-molded glass-plastic building panels are made in 4 x 12-ft. sizes for outdoor or indoor use by Chemold Co. (Santa Monica, Calif.). Panels are ribbed for extra strength and have tapered end and side laps for simple watertight joints. Company reports success with the glass-plastic building panels in both industry and home building.—Mod Plastics, Nov, p100

Tunnel Lighting—A single line of two- and three-lamp fixtures provides up to 26.4 foot-candles of illumination to the roadway in San Francisco's 1,616-ft. Broadway tunnel. Supplementary illumination is provided at entrances to minimize usual high contrast. Driver comfort in the two-lane tunnel is enhanced by harmonious color selection of lamps and tiling and automatic controls for lighting circuits.—Elec C&M, Nov, p180

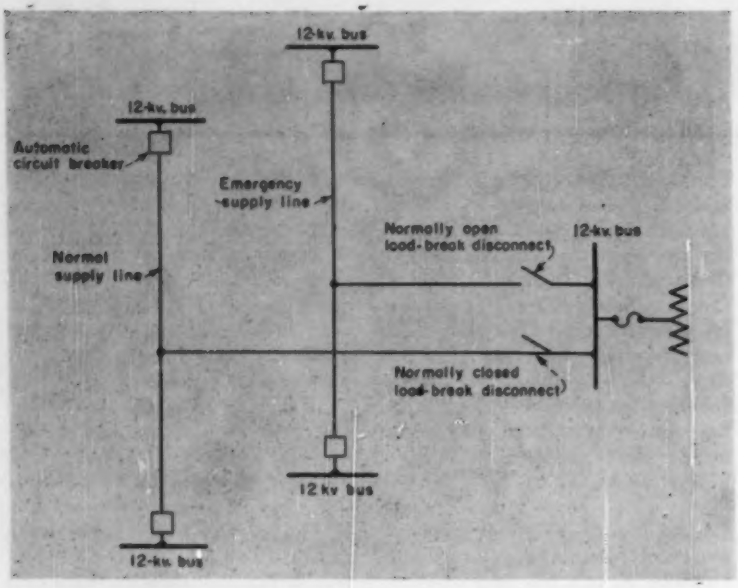
Fire Tests Prestressing—Prestressed concrete bridge (Massachusetts Department of Public Works) was subjected to an intense accidental fire. Only damage observed was spalling of the pier and the faces of the prestressed beams in the center strip where heat was concentrated. Load tests up to twice the live load indicated no damage and deflections well within calculated limits.—Eng News-Rec, Oct 28, p17

Welding Aluminum Alloys—Ryan Aeronautical Co. has found deflection firing valuable in resistance welding of aluminum alloys. A resilient member with dial indicator, microswitch, and adjustment is situated between electrode and pressure members of machine. It lets current flow only at exact pressure desired, thereby providing excellent control throughout the welding cycle.—Weld Eng, Nov, p54



Abrasive Blast Cuts Hard Materials

Air-abrasive unit, made by S. S. White Dental Mfg. Co., permits operations either impractical or impossible by conventional machining methods. Uses include cutting, surface-film removal, etching, scoring, notching, shaping, drilling. Aluminum-oxide particles (27 microns) have virtually no abrading effect on soft materials. Unusual applications in current use are cutting inside threads in glass tubing (shown), grooving deposited carbon film resistor, shaping cylindrical crystals for neutron diffraction work, and drilling quartz disks. Abrasive stream directed through carbide nozzle at 1,100 ft. per sec. produces cutting action.—Prod. Eng, Nov, p146



NEW SWITCHING SCHEME has two load-break disconnects that can be connected for manual or automatic throwover. No high-interrupting capacity breakers are needed.

Supplies Small Loads

More economical service can now be provided to small industrial customers without loss of efficiency through use of a new switching scheme

A LOAD-BREAK disconnect-type switching scheme can provide economical service to small industrial customers having loads below 2,000 kva. from a 12-kv. system. Experience since 1952 by a Chicago, Ill. utility company shows reliable service at less cost than the 12-kv. loop system. The scheme also relieves the 4-kv. general-distribution system.

Chicago customers have for many years been served from the so-called 12-kv. loop system consisting typically of 500-MCM underground cables looped into each customer's electric service station through circuit breakers relayed to switch out a faulty loop section. Apart from costly switchgear necessitated by wide fluctuations in interrupting duties, the loop system has given good service at reasonable cost for loads of 2,000 kw. or more. It is somewhat more expensive for lower loads and prohibitive for loads below about 1,000 kw.

The new switching scheme provides as good or better service to smaller customers and takes advantage of the inherent economy of 12-kv. supply. With the disconnect gear, two independent lines are tapped into each electric service station (see diagram). One switch is normally open, and that line is available for reserve. Throwover between lines may be either manual or automatic.

Disconnect equipment used has a normal current carrying capacity of 600 amp. at 12 kv. and is designed for normal "load-break" operation without fault interrupting capacity. Routine load transfer, therefore, can be handled without customer interruptions. Likewise, if normal supply fails, the emergency supply may be connected without customer help.

Load-break feature makes automatic throwover possible where required. The throwover device is a spring-operated mechanism actuated by a no-voltage release on the "normal" line.—Elec World, Nov 1, p86

Big New Market Looms for Rubberized Asphalt

New market for rubber and asphalt may open up in highway paving. Number of tests are now being made on several highways to check claims that Rubarite, an additive made by Rubarite, Inc. (Chicago, Ill.), improves asphalt as a paving material.

Rubarite is a mixture of 75% by weight of butadiene-styrene synthetic rubber and 25% of barites, or barium sulfate. It is a freely flowing powder with 1-micron rubber particles and 5- to 10- micron barite particles.

After 4 years, advantages of rubberized asphalt paving appear to be:

- Softening under heat is reduced one-half with as little as 10% additive.
- Ductility and strength are increased, thereby increasing paving life, reducing maintenance costs and frequency of paving failures.
- Cracking is reduced on asphaltic overlays or resurfacing of concrete pavements.
- Rubberized asphalt is much less slippery when wet than is ordinary asphalt.

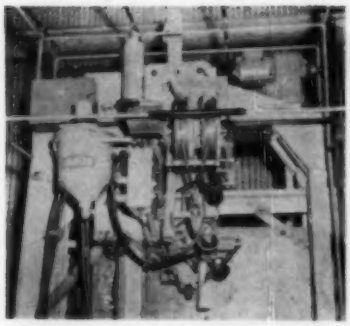
Other successful uses for rubberized asphalt is as a crack and joint filler, adhesive for traffic markers, and waterproofing for bridges, culverts, and similar damp spots.—Oil & Gas J, Nov 8, p119

High-Rake Cutters

Tests on machining of oil-hardening tool steels with high-angle high-speed-steel cutters gave these results at Taft-Peirce Mfg. Co. (Woonsocket, R. I.):

1. Feeds and speeds double to triple those with standard high-speed-steel cutters. Carbide cutters did not work effectively.
2. Horsepower requirements less than with standard cutters.

Tests showed that equipment had to be in first-class shape and all available supports used. Operators had to be unusually alert to avoid damage to work and cutters. A large flow of coolant was necessary to prevent burning of work, cutter, or both.—Am Mach, Nov 8, p173



Vertical Welding

Automatic submerged-arc welding of vertical joints is under test by Graver Tank & Mfg. Co. (East Chicago, Ind.). A carriage hangs on the free edge of vertical shell plates. Suspended from the carriage are two steel columns, each linked to a welding head. Glass-fiber strip is fed under each nozzle onto the plate surface. Flux is fed continuously and recovered by twin vacuum hoses bearing along edges of fiber strip.—Weld Eng, Nov, p48

For D-c. Packaged Power, Try Selenium Rectifiers

Growth in applications of direct-current machines has placed increasing emphasis on selenium rectifiers as a means of converting alternating current to direct current near the direct-current load centers. In view of the important role selenium rectifiers are playing in industry today, close attention is being paid to their characteristics and advantages.

Selenium cells are rated by volts and amperes. Makers' guarantees specify an operating voltage within fairly wide limits. Overloads are not serious, but sustained overloads can lower rectifier efficiency by reducing valve action. Similarly, aging may be stepped up by overload, though this also depends on temperature and nature of duty cycle. Rectifier ratings hinge on voltage and current. Usually lower-voltage plates carry more current than high-voltage units.

Advantages of selenium units can be summed up in terms of low initial cost, high efficiency, simplicity, and reduced maintenance. In industrial application, they are making great strides today in the lower-voltage fields such as plating.—Power, Nov, p85

International Business Briefs

Buenos Aires — Argentina's Central Bank will allow the importation of equipment valued at 120-million pesos to re-equip the country's dairy industry. Purchases will be permitted from Denmark, Sweden, Switzerland, Holland, France, Belgium, Austria, Japan, Italy, and, in some instances, from Britain and West Germany.

Johannesburg—South African Railways, contrary to earlier reports, have not placed orders in Switzerland for railway coaches. The coaches will be ordered on the basis of international tenders, which the Swiss, among others, will submit. Total order will run to about 3,000 units.

New Delhi—The Indian Government will request bids for the construction of a 600-ft. graving dock, wharf, and other related works for the development of the naval dockyard at Bombay. Details are available from Sir Alexander Gibb and Partners, consulting engineers, Queen Anne's Lodge, Westminster, London, S. W. 1, England. Requests must include full information on similar work completed. Copies should be sent to Nagendra Singh, Esq., I.C.S. Joint Secretary, Ministry of Defense, New Delhi, India. Applications must be accompanied by £100 or 1,300-rupee deposit. Bid deadline is Feb 28, 1955.

Hamburg—West German glass industry continues its export progress. The monthly rate is now 100,000 tons of goods, worth 25-million marks. Exports for the first 9 months of last year about doubled all of 1953's exports.

WARNING

Industrial skin accidents cause more lost time than broken bones.

It's a waste of time to preach safety in your plant and at the same time neglect to protect your employees from skin hazards caused by oils, acids and alkalis. You risk lost production, costly claims and good employee relations.

Industrial liquid-tight gloves, selected from the complete line of 36 non-allergic, oil and acid resistant PIONEER Stanzoil and Stanflex Gloves, are protecting workers in thousands of plants from every hand-skin hazard—at very low cost per hour.

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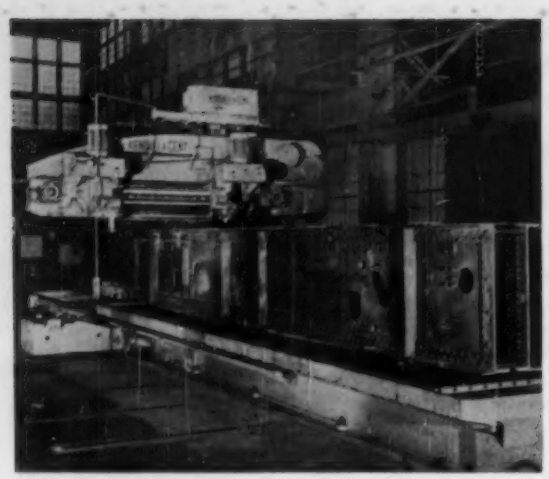
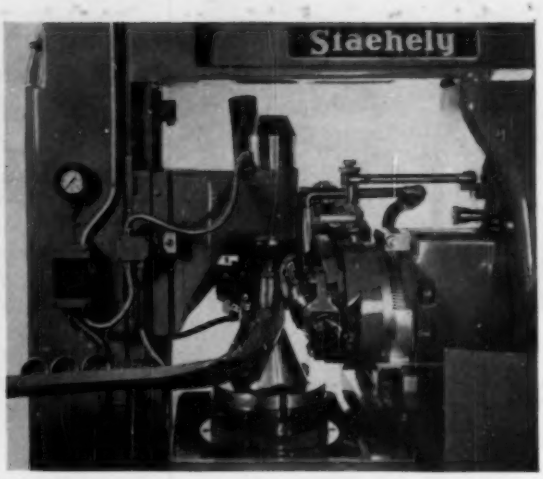


BRITISH 200-ton open-side planer-miller, now at work in Canada, is characteristic of British simplicity in design



GERMAN gear hobber, with automatic cycling, is loaded from magazine (behind head) and discharges into chute

European Machine Tools

Last month we told you what to expect in American machine-tool trends. But European design may give you more flexibility.—An original Digest article

MACHINE-TOOL INDUSTRIES, the world over, are not overly anxious to reveal their innermost secrets. Even west of the Iron Curtain, reliable data for different countries are not readily and quickly available because their yardsticks of measurements lack consistency.

But the figures available for Europe indicate a substantial increase in value and volume of machines over prewar production. Since 1938, England has increased production nearly five times by value, Germany nearly three times, France over six times. In terms of dollars at constant 1948 prices, Western Europe has boosted output from $490-million in 1938 to $632-million for 1953 (estimated by UN Economic Commission for Europe).

Since World War II, pent-up demand and more recently the rearmament flurry set off by the Korean war resulted in the full output of the expanded machine-tool industries being readily absorbed at home and in adjacent markets. As Korean defense tooling tapered off, a period of readjustment set in, just as in the U. S. Its effect has been rapidly falling backlogs in most countries, but a recovery in backlog position is now becoming evident.

In general, production and exports are in a fairly healthy state. Examples: British exports, while about 10% below 1953, are good. German 1954 business appears practically unchanged from 1953; exports now are about half of total production instead of the 35 to 40% before the war.

But the slackening in over-all business, as in the U. S., is causing some uneasiness among European manufacturers. The growth in the European metalworking industry, however, should maintain their machine-tool output well above the prewar level. Also, prospects are good for increased East-West trade, although this may not be all one way.

What is Europe offering in machine-tool designs? General trends are treated on the next page. Let's look now at development trends in separate countries.

• **Germany**—This country's remarkable recovery since the war, helped by a fresh start, U. S. aid, and immigration of leading designers from East Germany, has re-established it as one of the three leading producers of machine tools. Original ideas—possibly over-elaboration in some designs—provide increased productive efficiency, ease of operation, high utilization through use of electrical, hydraulic and pneumatic programming systems.

The Germans have departed too from conventional designs of standard machine tools, showing originality in bed and slide construction and in various driving arrangements. Whether this has been justified by results is still uncertain. The Germans also have exploited the copying principle on a wide scale and are developing transfer machines and unit construction.

Prices of German machine tools have been higher than British machines, despite lower wage rates. The higher prices could well be due to some of their engineering developments. Machines shown at the Fourth European Machine Tool Exhibition at Milan indicated that some makers were correcting excessive complication.

• **Britain**—The principal feature of the British machine-tool industry has always been its wide range of machines, particularly

the great variety of general-purpose machines in medium sizes. Massive machines too have seen progressive development, notably in large precision gear hobbers. Deliveries on these machines are still quoted at 3 to 4 years.

Characteristic of British machine tools are their rational simplicity in design and their sturdy construction. As a rule, British makers have refrained from the more exotic design frills incorporated in many Continental machines without practical justification in relation to added complication and maintenance difficulties.

Design trends are the latest ideas in automatic control and operation; use of electric, electronic, pneumatic and hydraulic features; automatic sizing devices; copy-machining techniques; pre-selection; simplified, centralized and directionless controls; spark, arc and ultrasonic machining. Greater power, plus higher speeds and feeds, permits full advantage from improved cutting materials and coolants.

• **France**—Under a protective cover of tariffs and import restrictions, the French machine-tool industry has improved and diversified its products. General-purpose machines predominate in the medium range.

Highly successful among French-developed machines are a high-speed screw-cutting machine that uses a single-point carbide tool (the Cri-Dan) and a range of copy-turning lathes (HEB) that are finding considerable use even in mass production in France and elsewhere.

Other important equipment includes an ingenious electronically operated coordinate table for radial drills and a self-contained unit head to be incorporated on transfer and multi-head machines.

• **Switzerland**—This country has long been noted for its high-precision machine tools. Even though some of their unique small machine tools for watchmaking have been barred from export for competitive reasons, the Swiss do a substantial export business; principal items, apart from the small machines, are jig borers, jig grinders, and single-spindle automatics.

Swiss design efforts have been directed to development of high-speed automatics, precision milling and grinding machines, and copy-turning lathes of unusual design. The latter include sizes large enough for gun barrels and even duplex-head types. Features include multiple cycling, automatic magazine feed, and single-point-tool generating of large threads.

• **Italy**—Range of machine tools is wide, including some massive boring mills and lathes. A considerable variety of standard machines is made, including a particularly good copy-turning production lathe with multi-cycling.

A notable feature in Italy is the entry of metalworking firms into the machine-tool industry. Fiat is producing several types of machines, including gear shapers and millers. Olivetti (business machines) has developed a line of fine grinders. Prices of Italian machine tools have been high.

• **Sweden**—Machine-tool production is on a small scale, with the machines usually built in metalworking plants as a subsidiary activity. Most are for the domestic market. Among those in demand in other countries are two precise centerless grinders that are adapted for magazine feed.

• **Belgium**—The industry is small but active, with products almost exclusively restricted to general-purpose machines. The restricted range is the result of a deliberate policy of rationalization to concentrate effort.

Design trends include comprehensive fixturizing, some automatic copying, and lately automatic cycling. The trend on the Continent to semi-jig boring machines, or coordinate borers, is represented by a small machine using end measuring rods and dial indicators.

• **Others**—Austria is a small producer. Among the machines are a line of fine boring machines, an unusual type of roller shear, and a slideway grinder with a traveling wheelhead carrying the operator. Holland too has a small industry. Major producer is a Dutch arsenal. An American firm, the Cincinnati Milling Machine Co., recently started production in a new plant to serve the European market.

General Design Trends

European machine-tool manufacturers are facing an insistent demand for machines flexible in application and tooling and yet capable, when used in batch and medium-quantity production, of high output comparable to specialized machines. To meet this demand, the makers are working along these lines:

Sturdy general-purpose machines with high power ratings and rigid spindle mountings are being built to permit carbide machining at high speeds.

Power feeds and rapid traverses in all directions, electro-hydraulically and electro-mechanically operated, with full automatic cycles are gaining wider use.

Pushbuttons are in fashion. Memory units, automatically set so the operator machines the first part, and electrical programming devices, some set by inserting plugs in sockets by guide cards punched for the job, are being built into some general-purpose machines.

Automatic control by punched strip, electro-magnetic tape, and other means is under active development. One British maker has a simple prototype using inexpensive magnetic tape in conjunction with hydraulically powered motions and solenoid controls.

Copy machining is getting continued attention with its great flexibility. Copy lathes can remove metal at extremely high rates, will soon be magazine-fed to extend their use into mass production, will take more work from turret lathes.

Jig borers offer new possibilities in production drilling and boring without costly fixtures. On one German machine, numbered dials are turned to the ordinates required for the next cut while one cut is being made; pushing a button at the end of the cut automatically brings the tool into position for the next cut. Another jig-borer trend is use of screen projector-type optical devices to permit fast table settings.

European manufacturers are not neglecting quantity-production machines. Take one example—single-spindle automatics; ancillary equipment mills flats, rolls threads, drills cross holes, turns contours. One automatic at Milan had a four-station unit alongside the headstock for several secondary operations after turning in the main spindle.

New Quick-Freeze Plant Widens Bread Market

Advanced refrigeration engineering applicable widely to bakery products features new quick-freeze bread and storage plant of Arnold Bakers, Inc., in Port Chester, New York.

Operating efficiency is keyed to centralized refrigeration control in which automatic thermostats call upon equipment units only as the load demands—both for quick-freezing and storage. Further, the freezing equipment permits continuous production, stops for defrosting being eliminated.

Sequence of processing is as follows: After baking and cooling, loaves are put on racks and wheeled into a freezing room where they are frozen at —15° to —20°F. Bread then goes into an adjoining room for carton-packing, then to a storage room where it is stored at 0°F. until the loaves are ready to be shipped in refrigerated trucks.

Maximum product quality is maintained under the system. Also, freezing permits more efficient distribution to distant markets—beyond a 40-mile radius—where premium breads are not generally available. Leveling of the work load is another important gain. Operators can work a normal 5-day week and Monday-morning demand can be met without abnormal expenditures.—Food Eng, Sept, p41

New Corrugated Board

High-quality corrugated board is now being made from wheat straw by Alton Box Board Co. (Alton, Ill.). Known as Cor-U-Cel, the board is the result of a lengthy research program that saw many materials studied.

Company chemists found that crush resistence of a corrugating medium depends largely on its content of pentosans (complex carbohydrates) as they help to bond the fibers. They found also that wheat straw contains far more pentosans than any other fibrous material economically feasible for converting into high-quality paperboard.

One trouble faced them: to retain these valuable adhesives in the fiber during digesting and refining. Following laboratory and pilot-plant success, the process they developed is now in commercial production. The product is used as the fluted center section of the corrugated paper board.—Paper Ind, Oct, p690

Good Equipment Ideas Reduce Project Time

Several ingenious devices for excavating and lining 26 miles of irrigation canals and laterals on an Arizona project were put into operation by Morrison-Knudsen Co., Inc. Prism-shaped, side-cutting wings were added to a standard wheel-type Buckeye trenching machine. This enabled the contractor to dig and trim the sloping walls of the laterals in one continuous operation.

Another piece of equipment raised the canal embankment to finished height. A wing blade mounted on a tractor pushed earth to the top of the embankment. Another bulldozer followed behind to smooth and compact the top of the bank.

Concrete-pipe joints were sealed with a new and faster method. A canvas sleeve was first wrapped around the joint and fastened in place. Concrete was then poured between the band and the pipe. Once the concrete had set, the canvas was removed.—Const Meth & Equip, Nov, p72

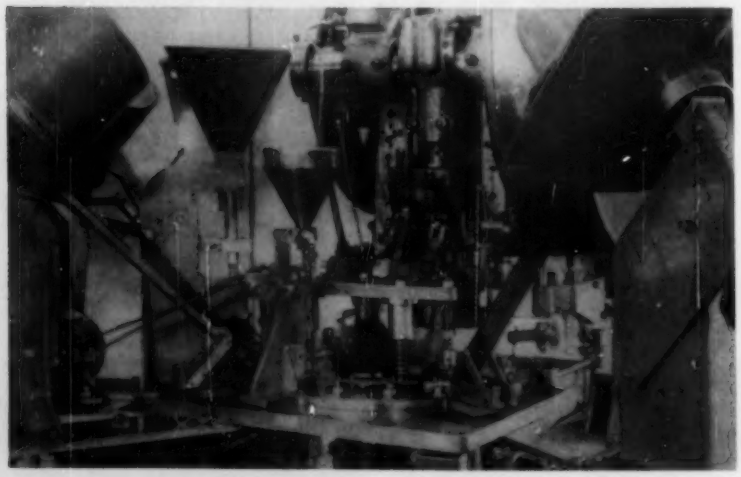
Steel-Strapped Carton Insures Safe Arrival

Damage-free arrival of shipments and elimination of pilferage were twin objectives of Quaker Oats new export-packaging line. Two steel-strapping machines (Acme Steel Co., Chicago) make up the heart of the line.

Steel strapping greatly increased the strength of the fiberboard containers and provided positive protection against pilfering. Strapping machines are skid-mounted to permit easy positioning by fork truck at any of four packaging lines.

Cartons approach the machines on roller conveyors. When centered over the strapping mechanism, the operator feeds out the required length of strap and wraps it around the carton. The strap is tightened, cut from the coil, and joined by welding.

From the time the carton arrives at the machine, all operations are mechanically performed. — Mod Packaging, Oct, p120



Dial Feeds Cut Stamping Costs

Dial feeds on presses concentrate a number of secondary or assembly operations at one point, save labor, improve product quality. This typical set-up assembles bearings for roller conveyors. Hoppers feed outside case, center core, lower race, 13 balls, and upper race to the dial. After parts are fed into one of the 16 dies, a checking station proves the assembly or stops the press by means of two precision snap switches. Assembly then passes to two closing stations under the ram. —Am Mach, Oct 11, p129

Four New-Product Failures

CASE 1. A small manufacturer of brass valves decided it could produce a power lawn mower.

Besides the fact that lawn mowers require a different sales force than industrial valves, another problem arose when production started. The company began making lawn mowers as soon as it could—before it analyzed all potential problems.

Factory management became involved in handling lawn-mower production problems as they appeared. Result was production of valves got tangled, too—so badly that the company abandoned the lawn mower to avoid losing its valve business.

CASE 2. A manufacturer of sterling-silver flatware decided to introduce a new pattern with a gold insert. The pattern was designed, dies were made, manufacturing was started. Samples went to the salesmen. The new product was a success.

But the method of assembling the gold insert was not completely satisfactory. Manufacturing had underestimated the time required to perfect it. Deliveries stopped during problem solving. That gave a competitor time to take over. When the new product finally reappeared, it was too late.

CASE 3. Another company's research produced a new, super-secret paper-making process. The company quickly set up full-scale production facilities in a completely walled-in, remote part of the plant.

Trouble developed immediately because the process required atmosphere control. And that was not possible in the location. So the process had to be relocated. Result: extra expense; time lost getting the new product to market.

CASE 4. A manufacturer of automotive replacement parts decided to add a group of related products. An inventory of finished products was to be carried at the factory.

Planning for the new products overlooked volume of in-process inventories required. Production areas became glutted with new parts and components, causing delays and safety hazards. Before the situation was corrected, there were many grievances and even threat of a strike.

New Products: Production Traps

Don't always blame new-product failures on sales or development. Sometimes the manufacturing department must bear the responsibility

MANUFACTURING sometimes is to blame when a new product fails to live up to expectations. The success of a new product depends largely on how well the manufacturing department shoulders its responsibilities. The four case histories above illustrate this important point. Some of manufacturing's responsibilities are outlined below. Your thorough acquaintance with them can save you trouble with your new product.

Selection of product. Before a product is adopted by the company, the manufacturing department should pass on the suitability of present production facilities, cost of tooling, additional equipment required, cost estimate, quality and safety considerations. You should be prepared with statistics on all operations, plant, and equipment that will enable you to evaluate the practicability of taking on the new product.

You should anticipate problems arising out of differences between this proposed product and what you are accustomed to producing. And know whether they are serious enough to recommend rejecting the product. You should have enough detail in hand to give a fairly accurate estimate of how long it will take to develop manufacturing methods and to tool up.

Pilot run. By having one man responsible for all processes in the pilot stage, you will be able to tie them together and achieve greatest over-all manufacturing economy, with least cost of time and money for development. Look for minor design changes that will not adversely affect the finished product, but will facilitate manufacture and reduce cost.

Every problem you do not anticipate and dispose of now will grow to much greater proportion when you are producing in large quantity. Then its solution will upset plans and schedules.

Planning for production. Your greatest responsibility is planning the production run. That includes procurement of raw materials; manufacturing processes and methods; personnel; tooling, equipment, and layout changes; schedules; control of in-process inventory.

Procurement of raw materials. While the purchasing agent may be responsible for procuring raw materials and components, and the traffic agent for seeing that they arrive on time, they cannot plan quantities or schedules without your advice. Tentative schedules that may be set up far in advance of the production run in order to prepare the suppliers for your demands may have to be changed when detailed planning indicates changes in schedules. Specifications too may have to be changed.

Tooling and equipment changes. Generally, any new equipment purchased for a new product should be as versatile as possible, and still perform the operation. In spite of the best possible planning, the new product may not be a success. In that case you will be much better off with equipment you can use for producing something else. There are exceptions, of course. If economies of production and contracts cover the entire amortization of the machine,

". . . inventory control is a problem"

then a special-purpose tool is justified.

Layout changes. When a new product is introduced into the factory, its volume, path or plan of flow, and space requirements may necessitate changes in plant layout. At any rate, the fitting in of the new product and its in-process inventory should be planned well in advance of the date of manufacture.

Failure to do so frequently results in disruption of not only the schedule for the new product, but also the schedules and cost of other products being manufactured in the same area. It means fitting the entire production pattern of the new product in with the pattern of all other plant activities.

Production schedule. All the variables must be taken into account in planning the production schedule—rates of performance by different machines and operators; quality of raw materials; interruptions in service, such as electric power; rates of rejection by inspection. On top of all this, you can expect variations in the basic schedule imposed by sales demand and availability of raw materials and labor.

Process inventory control. In many companies, inventory control is a problem. There is a constant running battle between the manufacturing department and the accounting department on the subject of in-process inventory. The former finds it easier to work with a large inventory between processes (subject only to limitations of space), because such an inventory bank between processes tends to take care of temporary dislocations of the production schedule in individual operations.

The latter, on the other hand, is conscious of working capital tied up in such an inventory, and the risks and financial burden associated with such an allocation of funds. This is a consideration demanding coordination between the two department heads.

Cost reductions. Cost reductions fall into two categories: (1) those that require changes in manufacturing processes only and therefore do not require approval outside the manufacturing department; (2) those that affect the product itself, by changes in design, material, quality, or performance, and must therefore be passed upon and accepted by other departments because of their possible effect on sales, service, returns, safety hazards.

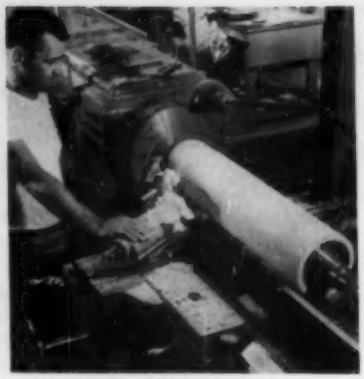
Nearly all designs may be simplified without adversely affecting their functions. After the product has passed the pilot run, you can see chances to redesign parts for fewer and simpler operations, or to use interchangeable parts for more than one model. Sometimes you can combine parts so as to simplify subassembly or final assembly. Redesign may let you work with easier tolerances without affecting the product's operation, thus reducing the number of rejects.

Reducing sizes of parts and finished products without interfering with performance can cut costs, too. It will pay to look for these opportunities.

Quality. In many cases there is a tendency to build too much quality into new products, rather than too little. This is understandable. The designers seek a perfect performance under adverse conditions of product use, and therefore design for as few failures as possible. In preproduction testing, flaws are discovered and corrected by upgrading design and quality of parts. Records are kept of rejects and reasons for them.

You will find it difficult to meet competition on cost if you excel materially in quality. The customer will eliminate products that are below his quality requirements; he will also eliminate products that are above his price standards. So be sure your quality standards are practical.—Factory, Nov, p132

Editors' Note: Manufacturing is just one of the phases in bringing a new product to market. Two previous DIGEST articles cover the new product from the moment of its inception to its sale. We recommend them to anyone who is contemplating a new product. For new-product developments, see May '54, p15. For new-product marketing, see Nov '54, p11.



Plastic Tin Rollers

Plastic rolls, machined to size and necessary smoothness (above), have been proposed as a substitute for the rubber-covered rolls now used in producing tin plate. Advantages, according to maker, Synthane Corp. (Oaks, Pa.), include resistance to acids, nonmagnetic and antistatic properties, and elimination of marks on tin plate resulting from bits of rubber that, picked up from present rolls, prevent soluble tin from being deposited on the steel.—Business Wk, Nov 13, p94

Four Floors Prestressed In New Office Building

Prestressed concrete beams and ribs provide the sole reinforcing for 3½-in.-thick concrete floor slabs in a 4½-story Los Angeles building. It is the tallest prestressed concrete building yet constructed in the U. S.

Floor slabs have no reinforcing except that provided by prestressing cables. Longitudinal ribs, spaced 7½ ft. on centers, run the full 170-ft. length of the building. Each rib is reinforced with one steel tendon. In the transverse direction, prestressed concrete beams spaced 8 ft. on centers span the 44½-ft. width. Six tendons prestress these beams.

Concrete for the prestressed floor system was specified as 5,000 lb. per sq. in. at 28 days. Because each floor system had to be free to shorten with application of the prestressing force, each floor was concreted and stressed before its supporting wall was cast.

Longitudinal ribs were prestressed first. Stressing was done from both ends simultaneously by the Freyssinet method. — Eng News-Rec, Nov 11, p33

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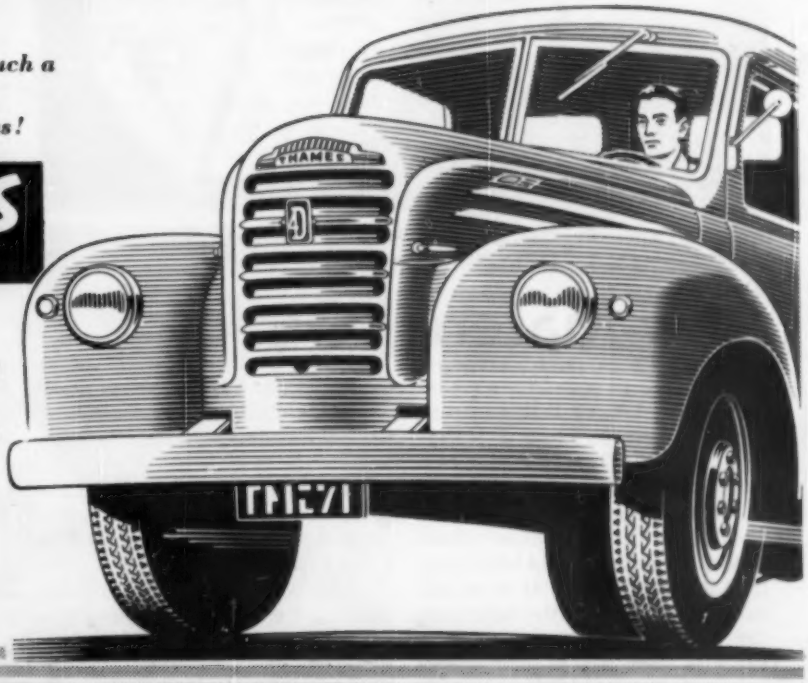
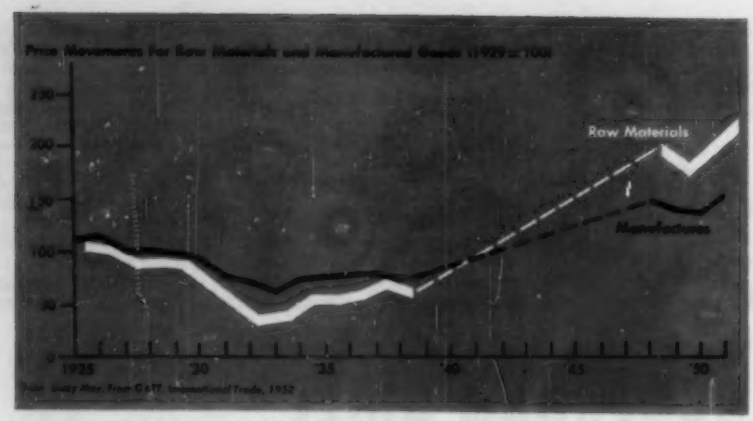
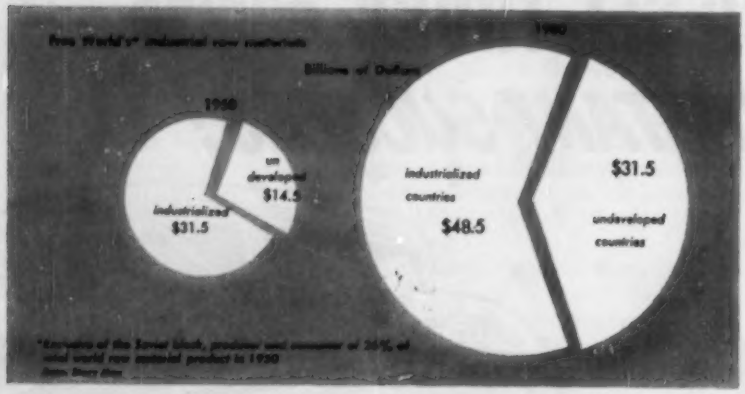


FORD PRODUCTS · MADE IN ENGLAND



PRICE: Even though depression has hurt producers of primary products, they have done better pricewise since the war than have manufacturers.



PRODUCTION: By 1980, under-developed countries will supply a greater percentage of the world's raw materials—more than twice what they supply now.

Raw-Material Outlook

INTERNATIONAL ECONOMISTS are beginning to believe that under-developed countries will make faster and sounder progress if they concentrate on raw-material production rather than industrial production. This theory is in direct opposition to the widely held belief that the development of manufacturing industries is the only hope for putting such countries on a par with their international neighbors.

Economic adviser, Stacy May, of Rockefeller's International Basic Economy Corp. is one of the strongest supporters of the new theory. He backs his contention with three principal assertions:

- Those nations described as "under-developed producers of raw materials" actually produce less than a third of the free-world supply of industrial raw materials.
- Turning out these primary products for export is constructive development and has nothing to do with exploitation.
- Producers of raw materials are doing better in terms of prices than producers of manufactured goods.

There would seem to be relatively little validity to the claim that under-developed areas lose out when they exchange primary products for manufactured goods. The claim is based on the feeling that raw materials are faced with erratic prices and uncertain demand, while manufactured goods enjoy a stable demand and steadier prices.

Since the beginning of World War II, however, the former extreme fluctuations of price for primary products have resolved themselves into a steady upward trend (see chart at left).

Predicting the future of raw-materials demand is difficult, but the needs of industrial nations are sure to increase. According to May, much of the added requirements will have to come from the presently under-developed areas. Cost of raw-material production in the industrial nations is already rising, and in some cases supplies are beginning to run low.

Stacy May's best guess on future production is that the under-developed countries could double their raw-material production by 1980. Sales should follow production. The necessary capital, he believes, is well within their investment possibilities.—Business Wk, Oct 23, p146

Sintered Nylon Parts Widen Material's Use

Nylon parts are normally injection-molded. Stress may be set up in the products requiring stress relieving by heat treatment for those intended for precision service. Such parts, however, may be sintered; no stress relieving would then be required.

Sintered nylon is cold-pressed molding powder fabricated by methods similar to those used in making powdered-metal parts. Standard formulations of sintered nylon are unfilled, graphite filled, and molybdenum disulfide filled. Special formulations have added fillers, such as silver, lead, copper, diamond dust, metallic oxides.

Parts made of sintered nylon are ideally suited for instruments, business machines, and for similar uses where oiling is difficult and where loads and speeds are low. Also well suited are intermittently operating parts, such as distributor breaker arms, windshield wipers, valve seats, packings.

Design requirements for sintered nylon parts are, in general, the same as those for powdered-metal parts. Profile parts can be made easily without machining. Economic tolerances for radial directions are ±0.0015 in. up to ¼ in., ±0.002 in. up to ½ in., and ±0.004 in. up to 1 in. and on length ±0.010 in. Closer tolerances require secondary machining operations.—Prod Eng, Nov, p150

Good-Housekeeping Cost Is Repaid Multifold

Good industrial "housekeeping" is a potent factor in accident prevention. But there are other advantages too: (1) better industrial relations resulting from improved employee morale, (2) better community relations from the plant's efforts to be a considerate neighbor, (3) lower maintenance costs for equipment, (4) possibly lower insurance rates.

Success of a housekeeping program depends on top-management's support and employee cooperation. Most plants promote good housekeeping along with safety by posters and slogans to keep workers cleanup conscious. Regular inspections and comparative ratings of departments create competition among groups and greater effort based on pride of winning.

Monsanto Chemical Co.'s plastics division (Springfield, Mass.) emphasizes good housekeeping in three or four campaigns a year. One campaign divided the plant into 30 areas, each represented by a car in an imaginary race. Members of the winning area, after four monthly inspections, were treated to a steak dinner and a ticket to a real stock-car race.

Unscheduled inspections are the keynote to Nuodex Products' program (Newark, N. J.). Each man in the winning group each month gets a $5 bonus, while each in the runner-up group get $2.50. Nuodex feels that greater efficiency and higher employee morale repay the cost many times over.—Chem Wk, Nov 6, p42

Uniform Glass Melting

Glass makers always have a tough problem in getting uniformity while melting glass in square or rectangular tanks, even with three, four or five burners.

The solution is simple. Phoenix Glass Co. (Monaca, Pa.) melts its glass in a round tank with a single tangential burner and the flue opening adjacent to it. The tank consists of a circular compartment with flux-block bottom and sides. The flame travels in a circular path. This eliminates cold corners. —Ceramic Ind, Nov, p73

Automatic Assembly Cuts TV Cost

Automatic assembly is saving time and reducing cost for the Admiral Corp. Vertically-mounted printed-circuit chassis are saving space also. A 30-ft.-long complex of machines takes in resistors, capacitors, and inductors at one end and turns out completely assembled printed-circuit boards at the other end every few seconds. Eight tubes are used on this chassis. Equipment is electronically controlled. —Control Eng, Nov, p14

Distortion Control in Welding Stainless

Techniques for welding stainless steels differ little from those for mild steel. But the greater emphasis on quality and the difficulty in removing defective welds justify greater care.

Distortion is the main problem. On thin sheets particularly, using a smaller electrode than for mild steel and avoiding heavy reinforcement reduce distortion. Welding should be carried out in straight runs with little weaving.

A balanced welding sequence is desirable so that successive weld runs pull against each other. Except where heavy runs give a less well-balanced welding sequence, preferred practice is to use a few runs of heavy-gage electrodes rather than many runs of light gage.

Other means to avoid distortion are to weld in a direction away from any areas of weld concentration and to apply "skip" or "step-back" techniques where possible. Distortion in thin sheet can be removed in finishing by hammering the weld on a flat bar or head from the reverse side; this restores the deposited metal to its original length and releases distortion-causing stresses.—Mach, Oct 22, p1869

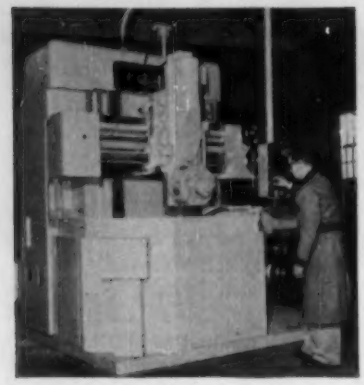
Tube Improves Radar

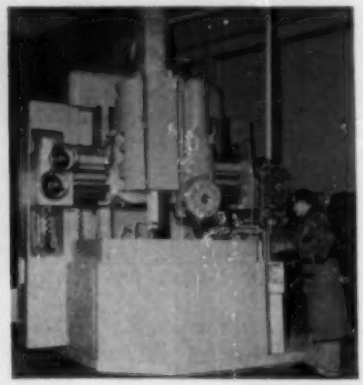
An advanced type of radar will be powered by a new high-power Sperry klystron amplifier. Eight feet tall, the new tube produces 4 megawatts of power with frequency control said to be 20 to 200 times closer than the frequency limits of ordinary radio or television transmitters.

A special focusing method concentrates electrons into a beam that passes through the rhumbatrons. In a prototype, electrons are so tightly packed that a 1-in. beam now transmits more current through a vacuum than a ½-in. copper wire can safely carry.

Tests show that the klystron has a power gain of 38 decibels. Plate efficiency of 43% has been measured with as high as 4 megawatts of peak power output.—Electronics, Nov, p200

NEW PRODUCTS





Vertical Turret Lathe Line Features Unique New Hydraulic Shifter Unit

Redesigned line of Bullard vertical turret lathes is designated as Cut Master model 75 in honor of the company's 75th anniversary this year. It includes six sizes (26, 36, 46, 56, 66 and 76 in.); shown are 26-in. and 46-in. machines, the latter having a ram as well as turret head and side head.

Outstanding new feature of model 75 is the pendant control, from which all functions of the machine are controlled. Unlike the ordinary pushbutton pendant, this unit incorporates directional lever action for ease of operation and safety. If a feed or traverse lever, for example, is pushed to the left, the head moves to the left. Horizontal, vertical and 45° motions are provided. Table rotation is controlled by a single jog-run lever. Speed and feed rate selectors on the pendant are direct-reading dial type.

Another new feature is the table support—a combination radial and thrust roller bearing. The outer race of the radial bearing serves as the upper race of the thrust bearing. The latter bearing is mounted on a shoulder in the bed casting.

The turret head consists of a saddle, swivel, turret slide, and a five-sided turret. It can be swiveled by a worm and segment up to 30° either side of the vertical to an accuracy of 2 min. Adjustable feed stops are provided for feed strokes in all directions.

The ram head consists of saddle, swivel, and octagonal ram. It swivels the same as the turret head and can be accurately positioned by pendant control or handwheel.

The side head, an independent unit, can cut horizontally or vertically while other heads are cutting. A four-sided indexing turret is mounted on the slide. Handwheel dials, as on the other heads, are graduated in thousandths; scales graduated in sixteenths provide direct reading of position.

Attachments available include hydraulic chucking mechanism, angular-turning device, thread-cutting and drum-scoring device, Man-Au-Trol, contour-turning device, and variable speed drive. The Man-Au-Trol attachment converts the machine to a completely automatic cycle, although the machine when so equipped can be operated manually if desired.—**Bullard Co., Bridgeport, Conn.**

Motor Driven Hoist

Because no ground excavation or special foundation is necessary, the Electro-Loader may be placed on upper floors, temporary locations, driveways, or almost any location where loading and materials handling service is needed. Lifting power supplied by an electric motor raises platform to 70¾ in. or to any intermediate point.—**Globe Hoist Co., 1000 East Mermaid Lane, Philadelphia 18, Pa.**

Bank-Posting Machine

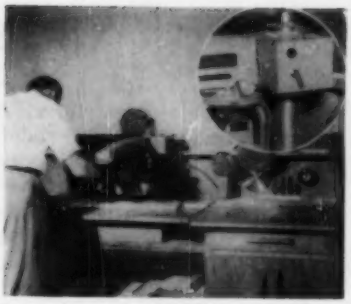
New bank-posting machine with automatic check count is now available. It combines features of high-keyboard machines with company's Sensimatic design.

Features of the new model, F212, are automatic check count with a listing and totaling capacity of four digits, simplified error correction, separate listing tape, auditors lock on the date section, and automatic total of accumulated balances. Production figures of checks, deposits, and active accounts are provided automatically. —**Burroughs Corp., Detroit 32, Mich.**

Cleans Liquid Coolants

Separator automatically filters out ferrous metallic particles from coolants and cutting oils for all types of machine tools. Separator can be installed on the machine-tool sump.

Contaminants are removed by means of permanent ring magnets completely enclosed in a revolving cylinder. Turbulent flow of coolant in a specially designed channel below the cylinder keeps metallic particles in suspension until attracted by magnetic field.—**Honan-Crane Corp., Lebanon, Ind.**



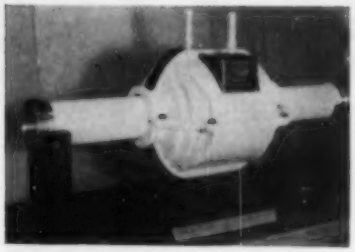
Safety Power Brake

A DeWalt safety power brake virtually eliminates "drift" time of the cutting tool after the motor has been shut off. For instance, a 9-in. saw blade with a normal drift time of 3 to 4 min. comes to a complete stop in 5 to 7 sec. when braked from an operating speed of 3,425 rpm. Controlled from a small steel box on the radial arm of the power machine, the brake is entirely automatic, functioning instantaneously when the motor is cut off.—**American Machine & Foundry Co., DeWalt Products Div., 261 Madison Ave., New York 16, N. Y.**

Handles Heavy Lifts

New series of 8- and 10-ton capacity electric hoists handles heavy lifts. Headroom of the new hoists is approximately 37 in. Lift height is 15 ft. and up. A choice of four mountings is offered—plain trolley, hand-geared trolley, motor-driven trolley, and lug mounting.

A powerful mechanical load brake precision-controls loads. Brake is constructed integrally with the hoist motor and gear reduction. Brake stops and safely holds loads more than one and one-half times the hoist's rated capacity.—**R. G. LeTourneau, Inc., Longview, Texas.**



High-Rated Flow Meter

New electromagnetic flow meter for 2- to 8-in. flow lines is specially rated for unlimited maximum flows, thus permitting measurement applications impossible with ordinary equipment. Meter will measure the volume flow rate to within ±1% accuracy of any liquid of sufficient conductance and velocity. It is particularly recommended for aqueous solutions, slurries, acids and other corrosives, and food and drug products requiring sanitary processing.—**Foxboro Co., Foxboro, Mass.**

Refrigerated Holding Tank

Small and large milk producers can save money by bulk-handling of milk, insure against spoilage and spilling, and get a better price. The Solar holding tank, available in five sizes from 120 to 500 gal., consists of an elliptical stainless-steel insulated tank with a steel cradle between inner and outer shells to prevent any tank bulging. The refrigeration system is installed as a complete unit at one end of the tank.

An agitator, driven by drip-proof electric motor, keeps fat content of milk uniform throughout the tank. Working height at tank is only 43 in.—**U. S. Industries, Inc., 25 Broad St., New York 4, N. Y.**

Diesel Tractor for Fuel-Poor Areas

Model WD-45 diesel-wheel tractor combines operating features of carbureted-engine models with a full diesel engine. Model meets power requirements of areas where gasoline, kerosene, or distillate are high in cost or not available. These features are standard equipment: (1) hydraulic control of drive-wheel traction, (2) two-clutch power control, (3) power-adjusted wheel spacing, (4) quick couple for attaching implements.—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Adding Machine Fits Hand

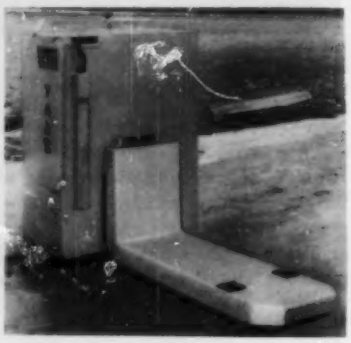
Ten-key adding machine features a window above the keyboard that shows each item as it is entered on the keyboard, before it is printed or added. A rearranged keyboard permits the hand—either right or left—to fall into natural working position and facilitates rapid touch operation. All operating keys are live.—**Friden Calculating Machine Co., Inc., San Leandro, Calif.**

Versatile Milling Machine

Toolmaster milling machine will be useful in toolrooms, repair depots, tool and die shops, pattern shops, and other machine shops. Three styles are No. 1A, manual feed to quill; 1B, power feed to quill (shown); and 1C, heavy-duty spindle head.

Motors for 1A and 1B are the "pancake" type, integral with the spindle head. Eight spindle speeds are provided by changing one or two belts, with three ranges available 108—2,825, 140—3,800, and 215—5,650 rpm. Model 1C speeds selected by sliding gears, range from 100 to 1,530 rpm.

Specifications include 16-in. longitudinal table traverse, 10-in. cross traverse, 17-in. vertical knee traverse, 36 x 10-in. table surface, 90° spindle-head swivel.—**Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**



Electric Platform Truck

New 4,000-lb. platform truck can stack in aisles of 56-in. width. It has three forward and three reverse speeds, two-position speed control lever and controls for hoisting and lowering loads, and safety-type foot brake. Platform sizes are 19, 24 and 26 in. in width and 36, 42, 48, 54 and 60 in. in length.—**Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.**

Granular-Dust Collector

Compact dry collector is highly efficient unit for collecting flyash from coal-burning power plants and larger dust particles from rock-crushing and bulk-chemical plants. The new collector, called the AMERclone, is made up of conical-shaped gray-iron tubes that give the air a tornado-like twist to throw larger dust particles to the outside while the clean air goes straight through. A test installation on a boiler rated at 300,000 lb. of steam per hr. and burning pulverized coal with 9.6% ash content trapped 3,000 lb. of flyash per hr.—**American Air Filter Co., Inc., Louisville 8, Ky.**

NEW PRODUCT BRIEFS

Vinyl Plasticizer—HB-20, a low-cost extender plasticizer for vinyl chloride, gives good viscosity stability to dioctyl phthalate plasticized plastisols. An alkyl-aryl hydrocarbon, HB-20 can be used as high-boiling solvent and as plasticizer for polystyrene, ethyl cellulose, asphaltic compositions. — **Monsanto Chemical Co., St. Louis 4, Mo.**

Checks Fuel Burning—Smokescope tells whether or not fuel is being properly burned to gain full heat advantage. Standard reference disks, shaded to correspond with degrees of smoke density, is compared against the background of a smoke plume. Excessive smoke means poor burning efficiency.—**Mine Safety Appliances Co., International Div., 201 North Braddock Ave., Pittsburgh 8, Pa.**

Air-cooled Condensers—New line of air-cooled condensers is designed for 2-, 3- and 5-hp. applications with any standard packaged conditioner in similar horsepower brackets. Major features include weatherproof finish, extremely quiet operation, oversize coil, and centrifugal-type fans, which may be installed inside the building or outside.—**Worthington Corp., Harrison, N. J.**

Capacitors—New fixed paper-dielectric capacitors are in drawn rectangular cases, which give greater protection against leakage than fabricated cases with soldered seams. Capacitors have capacitance ratings from 0.5 to 16 microfarads and voltage ratings of 400 to 12,500 v. dc. and 236 to 660 v. ac. —**International General Electric Co., 570 Lexington Ave., New York 22, N. Y.**

Hydraulic Power Unit—Quill-type unit actuates tools in special machines. Two models, with 8- and 12-in. strokes, are self-contained units that accommodate single tools or multiple spindle heads for drilling, reaming, counterboring, spot facing. — **Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.**

MANAGEMENT REPORT

Utility managements are thinking more of human engineering because it is now believed that half the forced outages in power plants are caused by human error. Human engineering—the study of man-machine relation—could prevent outages by use of operating procedure check lists, color coding of instruments, and arrangement of instruments in the sequence in which they are used. Human engineering recognizes too that a man's work must be made active and interesting when he is a component of a control or operating system.—Elec World, Nov 15, p112

How to use engineers to best advantage is a problem in most industries. One proposed solution is the greater utilization of engineering aides to carry on many of the jobs commonly done by engineers themselves. An example is bread-board wiring in the electronic laboratory. An engineering aide is qualified for this job.

A recent study by the U.S. Labor Department shows that use of engineering aides differs with industries. For all companies surveyed, the number of supporting technicians employed per 100 engineers averaged 120, made up of 55 aides and 65 draftsmen. Other results: ship building—103 aides and 181 draftsmen per 100 engineers; aircraft manufacture—48 aides and 37 draftsmen; electronics industry—44 aides and 32 draftsmen. —Electronics, Nov, p5

What management should look for in distributors and retailers to handle their products is well illustrated by Socony-Vacuum's standards for gasoline-station dealers:

- Reasonable maturity and good health.
- Keen ambition to go into business to improve his and his family's economic position.
- Competitive spirit.
- Willingness, even eagerness, to accept practical help and advice, such as to sell in a favorable atmosphere and to stress hidden values of the merchandise.

Aircraft and textile, chemical and railroad—these are only a few of the many industries that are turning more and more to stainless steels because of their superior physical properties and pleasing appearance. The whole story of stainless—uses, types, and fabrication—is given in the large-size, hard-bound book, "Enduro Stainless Steel." For your copy, write on your company letter-head to Republic Steel Corp., Export Department, Chrysler Building, New York 17, N. Y.

Executive training is considered a serious managerial responsibility at Hooker Electrochemical Co. Young engineers are assigned to process study groups and given a series of assignments to include varied experiences, extending over several years. A young engineer, for example, may make a study of process economics or go into the plant to gather production data on a particular operation and improve its efficiency. Assignments also include informal training in business matters, human relations, and other such subjects.

A unique feature of the program is its temporary promotions. This reduces chances for error in making promotions by previewing a man's effectiveness in a post of greater responsibility. The temporary promotions are building up a reserve of trained and tested talent and, at the same time, give the men a greater appreciation of problems facing their superiors.—Chem Eng, Nov, p258

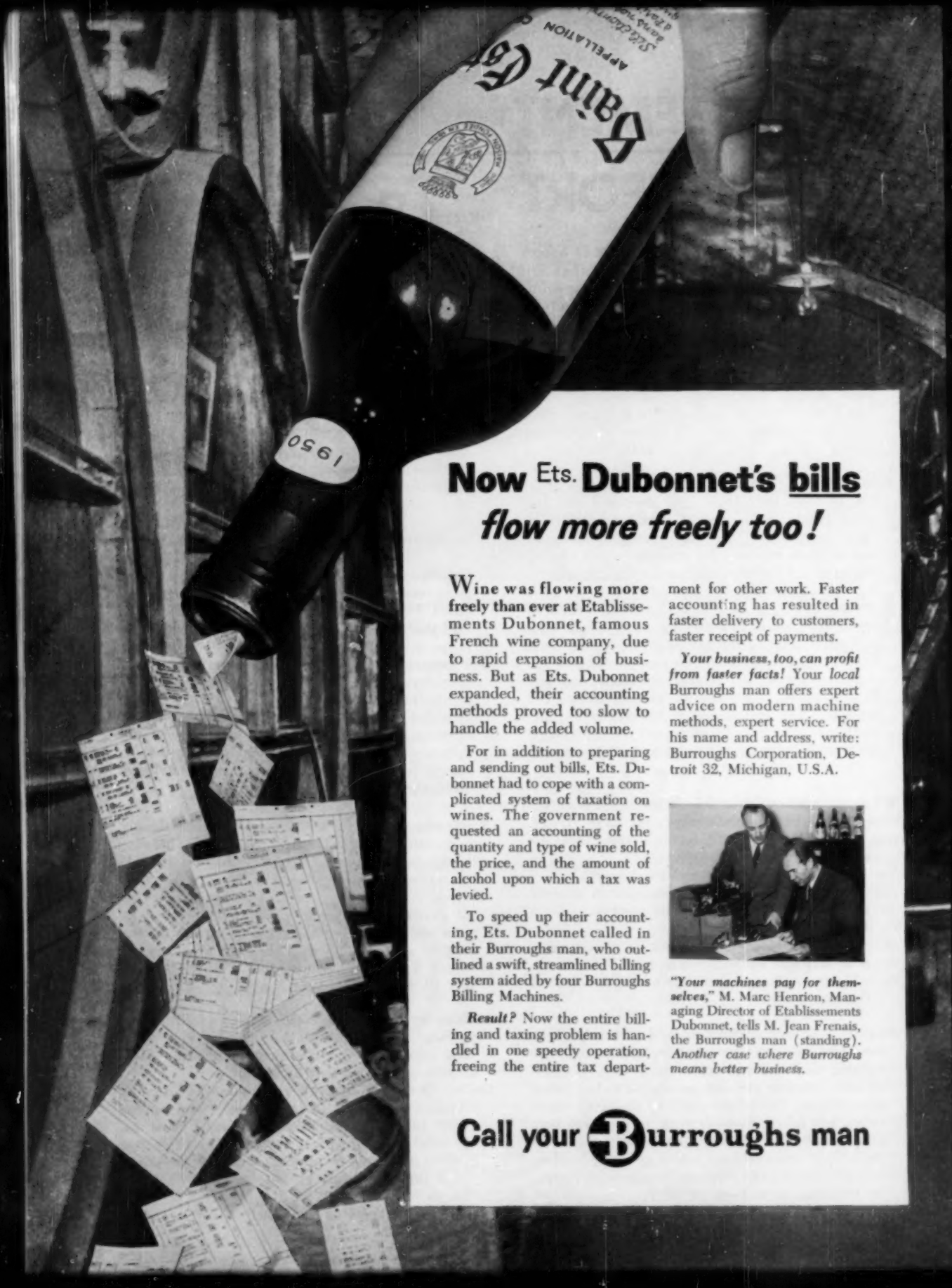
"**A glass eye is no substitute for a real one**, and a compensation check will not replace a pay check." The president of Gisholt Machine Co. said that in a letter to each employee, asking for cooperation in a new eye-protection program.

The program now makes goggle wearing compulsory for every employee, regardless of department. Goggles, prescription-ground or plain, are provided to employees at company expense. The program so far has cost $8.12 per employee. Results are not yet known, but Gisholt figures to be repaid fully in lower accident costs and lower insurance rates.—Am Mach, Oct 25, p123

Electronic computers are playing an increasingly important role in business operations because of the development of a new management tool: operations research. Reduced to its simplest terms, operations research consists of amassing all available data on a given function such as sales and attempting to derive from such data a pattern or norm. Without the computer this becomes a nearly hopeless task.—Business Wk, Nov 13, p104

Articles written by your technically qualified employees carry considerable prestige value for your company. But it's hard to uncover good articles and competent authors.

Dravo Corp., Pittsburgh, sponsors an annual "Technical Papers Competition" and gives $1,200 in prizes. Qualifying material must be (1) related to Dravo's operations, (2) presented in such a way as to increase company prestige, (3) actually written by the author.—Factory, Oct, p125



Now Ets. Dubonnet's bills *flow more freely too!*

Wine was flowing more freely than ever at Etablissements Dubonnet, famous French wine company, due to rapid expansion of business. But as Ets. Dubonnet expanded, their accounting methods proved too slow to handle the added volume.

For in addition to preparing and sending out bills, Ets. Dubonnet had to cope with a complicated system of taxation on wines. The government requested an accounting of the quantity and type of wine sold, the price, and the amount of alcohol upon which a tax was levied.

To speed up their accounting, Ets. Dubonnet called in their Burroughs man, who outlined a swift, streamlined billing system aided by four Burroughs Billing Machines.

Result? Now the entire billing and taxing problem is handled in one speedy operation, freeing the entire tax department for other work. Faster accounting has resulted in faster delivery to customers, faster receipt of payments.

Your business, too, can profit from faster facts! Your *local* Burroughs man offers expert advice on modern machine methods, expert service. For his name and address, write: Burroughs Corporation, Detroit 32, Michigan, U.S.A.

"Your machines pay for themselves," M. Marc Henrion, Managing Director of Etablissements Dubonnet, tells M. Jean Frenais, the Burroughs man (standing). *Another case where Burroughs means better business.*

Call your Burroughs man

Epoxies Insulate Motors

Synthetic resins are solving some of the problems caused by moisture, corrosion, and severe wear with consequent savings in down-time and repairs.

EPOXIES combine high dielectric properties with a low viscosity when liquid and a hard finish when set. These plastic resins are now utilized as insulation for electric motors. The result: moisture, chemical atmosphere and severe operation no longer pose the problems they did.

As an example, stators (rotors in wound-rotor motors) have normally been sealed after winding with varnish, usually a phenolic-based varnish, having a solids content of from 30 to 50%. The stators were dipped in a tank of varnish in the often erroneous hope that the varnish would flow into and completely saturate each cell. Actually, the extent and uniformity of the coating is questionable.

Coils, bedded in slot paper, are wedged tightly into the stator and cause partly or entirely dry areas as well as incomplete saturation of the slot paper. Pressure points occur in all cells, so the very points that require the best coating get the least. Even vacuum and pressure impregnation do not remedy the situation.

Similarly, it is impossible to fill air pockets with varnish. Even if the varnish is driven in, there is still an eventual void space of 50 to 70% as that much solvent or volatile matter is driven off in curing. The result is less heat transfer, as literally thousands of air pockets of various size are formed in the slot areas by wire cross-overs, pressure points, uneven iron laminations, and bent wires.

ROTORS insulated by epoxies are sealed against damage by a tough flexible shell.

Thus, reasons for motor failure are readily apparent. Under high humidity, temperature changes between a running and an idle motor are such as to suck moisture into the stator slots.

One company has avoided these problems by using a new winding technique that utilizes *Epoxylite*, made by America Insulating Materials Co. Stator iron is cleaned, usually by sandblasting, and all sharp burrs are filed away. Bare stator iron is immersed in an Epoxylite insulating formulation (based on Shell's Epon 1007 resin) and cured. This step is repeated until about a 4- to 6-mil coating is obtained over the entire stator's iron and slot sections. This gives positive cell insulation right on the bare iron before the cell is wound and obviates the use of paper. Regardless of pressure points that occur in winding, cell insulation is positive.

The stator is then wound according to accepted practice. To overcome sealing and filling problems involved in final motor insulation, an epoxy-based formulation is used. This has a less-than 2% shrinkage in filled in formulations when cured.

To solve the drainoff problem encountered with varnishes, a thixotropic *Epoxylite* paste has been developed. With this material it is possible to make a mold that becomes a part of the insulated motor. After it is formed, an *Epoxylite* sealer is poured into the mold, which allows it to flow into the slots and fill each cell section. The result is a greatly strengthened motor with the entire winding potted and insulated.—Power, Nov, p122

Twin-Engine Tractor

Each track of Euclid Division, General Motors Corp., new experimental crawler-tractor is powered independently—a 190-hp. diesel working through a torque converter and automatic transmission drives each side. Split down the center, each half of the tractor is a separate unit connected by only a transverse shaft on which the halves are free to oscillate a maximum of 7 in. Splitting the tractor allows easy transportation from job to job. Individual drive to each track makes steering flexible.—Const Meth & Equip, Oct, p98

More Electrodes Speed Automatic Arc Welding

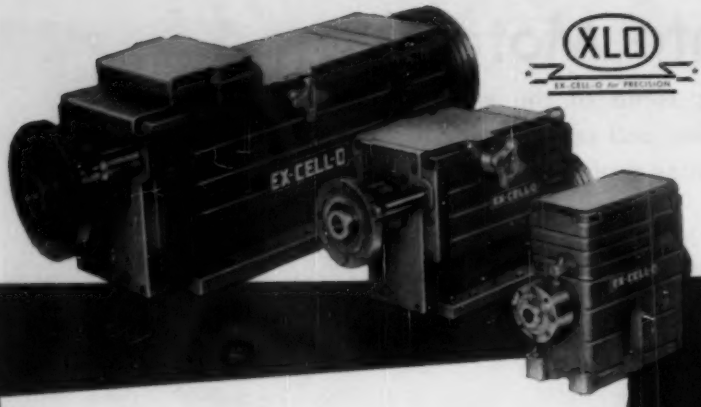
If you use automatic submerged-arc welding and want to speed it up, you can now do so. Equipment has been improved to give speeds up to 50% over conventional submerged-arc welding.

One method is to feed more wire into the weld puddle by using a wire of larger diameter. The newer way is to use more electrodes. Two, three, even four electrodes can be concentrated in the same puddle.

Multiple-electrode welding may be applied for the same jobs being done by single-electrode submerged-arc welding. The electrodes may be positioned in tandem (one behind another), side-by-side, or skewed at an angle to the welding groove.

If you want to modify a standard welding head for two-electrode use, install:

1. Second drive roll.
2. New idling roll.
3. New guide tubes.
4. Nozzle with double contacts so that current may be uniformly fed to both electrodes.
5. Second electrode reel.—Weld Eng, Nov, p86



Build High-Production Machines
WITH THESE
EX-CELL-O Quill-Type
HYDRAULIC POWER UNITS

Ex-Cell-O Power Units feed or rotate tools in easily controlled automatic cycles. A single tool can be held in the unit spindle or a multiple head can be bolted to the quill flange. The Units are used in low-cost, high-production machines for such operations as drilling, reaming, counterboring and spotfacing. A typical machine consists essentially of a plain base, a work-holding fixture and one or more power units.

Ex-Cell-O Units are self-contained and compact; can be mounted horizontally, vertically with the spindle nose down, or at any angle between these positions.

Ex-Cell-O styles 28-A, 21, and 20 Quill-Type Hydraulic Power Units are shown above. Also available—New Long Stroke Style 22. Send for *all* the facts about them. Write or cable Ex-Cell-O.

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New Steel Tubing

A new process meets a new demand. Result: lighter, stronger steel tubing for the oil industry

To meet a small but growing demand from the oil industry, Jones & Laughlin Steel Corp. (Pittsburgh, Pa.) has started production of a high-strength steel tube. The tube will actually be produced in two strengths, 80,000 and 110,000 lb. per sq. in.

Behind the need for super-strong tubing lies a trend toward ever-deeper oil wells. Wells of a depth of 10,000 ft. are no longer uncommon, and the experts predict still deeper wells during the next few years. Because of the requirements of deep wells, and because off-shore drilling is making new demands on tube strength, the oil industry has turned to the steel industry for help.

J & L's answer follows the approach to the problem of the rest of the steel industry. By means of a comparable process, such companies in the industry as U. S. Steel, National Supply Co., and Colorado Fuel & Iron Corp. are also turning out high-strength tube.

The heart of the process is a gas-fired furnace. The tube is fed into it and heated to about 1650 F. When it comes out of the furnace, it is cooled suddenly in a water spray. This makes the tube hard and brittle. To take out the brittleness, the tube goes from the water spray to a second furnace for heat treating. By gentle reheating, the quench-hardened steel is tempered to restore ductility and toughness.

From the second furnace, the tube passes over a cooling bed and through a machine that sizes it to exact diameter. Finally, it is straightened and threaded.

The 80,000-lb.-per-sq.-in. tube now made by this process is of carbon steel. Formerly this strength could be attained only through the use of alloys. And even with alloys it was almost impossible to produce tubing with a strength of 110,000 lb. per sq. in.—Business Wk, Nov 13, p91

NEW FREE CATALOGS

Heating and Air Conditioning—Bulletin PB-290 contains information on complete line of basic equipment required for practically any heating and air conditioning system you may desire.—Trane Co., La Crosse, Wis.

Lumber Drying—Bulletin contains complete information about Sipho-Fan operating equipment used in the scientific and accurate drying of lumber.—Imrie Dry Kiln Co., Michigan Trust Bldg., Grand Rapids 2, Mich.

Measuring Surface Roughness—The complete line of profilometer equipment for measuring surface roughness is described in form C52-11-52-10.—Micrometrical Mfg. Co., 345 South Main St., Ann Arbor, Mich.

Filtration Equipment—Bulletin 6300 describes in detail the types, sizes, capacities, and operating and mechanical features of the Dorrco Distributor.—Dorr-Oliver Inc., Barry Place, Stamford, Conn.

Strip Metals—Illustrated brochure describes a single source for a wide variety of thin-gage and close-tolerance ferrous, nonferrous and precious strip metals now available in any quantity for all industry.—American Silver Co., Inc., Industrial Div., 36-07 Prince St., Flushing 54, N. Y.

Die-casting Machines—Bulletin describes in detail models 50 and 100 die-casting machines.—Cleveland Automatic Machine Co., Cincinnati 12, Ohio.

Switches and Actuators—Catalog No. 74 gives complete information on ultra-small "type V3" precision snap-action switches and auxiliary actuators.—Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave. S., Minneapolis 8, Minn.

Dust Control—The AMERjet fabric arrester, an efficient dust collector that provides a practical and economical solution to a variety of dust problems, is described in bulletin 279.—American Air Filter Co., Inc., Louisville 8, Ky.

Chain Drives—Design features of silent chain drives are covered in book 2425.—Link-Belt Co., 233 Broadway, New York 7, N. Y.

All-crop Harvester—Detailed information and specifications on the model "100" self-propelled all-crop harvester are given in bulletin TL-1038-537.—Allis-Chalmers Mfg. Co., Tractor Div., Milwaukee 1, Wis.

Optical Developments—Book entitled "Optics plus" tells the unusual story of the growth and expansion of a vital American industry into new and unexplored realms. For your copy, write on your company letterhead to Perkin-Elmer Corp., Norwalk, Conn.

Vacuum Furnaces—Bulletin No. 790 discusses the rapidly growing new field of vacuum metallurgy and includes a comprehensive treatment of the effects of processing various metals and alloys in vacuum.—F. J. Stokes Machine Co., 5500 Tabor Rd., Philadelphia 20, Pa.

Automatic Staple Tackers—Catalog illustrates and describes the various Duo Fast tackers and staplers. Catalog includes suggested uses and pictures of various machines.—Fastener Corp., 860 Fletcher St., Chicago 14, Ill.

Tracer Control—An all-electric tracer control system that provides automatic control of one or more machine motions is described in bulletin GEA-6122.—International General Electric Co., 570 Lexington Ave., New York 22, N. Y.

Handling Bulk Materials—Various types of equipment and structures for handling coal, ore, and other bulk materials are described and illustrated in bulletin 225. For your copy, write on your company letterhead to Dravo Corp., Neville Island, Pittsburgh 25, Pa.

Brazil—Informative booklet entitled "Brazil—A Report on Business and Trade" discusses the present and future economy of Brazil.—National City Bank of New York, 55 Wall St., New York, N. Y.

Hardfacing With Stellite—Have you got equipment with vital parts wearing from abrasion, corrosion, or heat? Booklet, "Hardsurfacing with Deloro Stellite," tells how to keep it running up to ten times longer.—Deloro Smelting Co. Ltd., Deloro, Ontario, Canada.

Lifting Devices—Complete information on Globe Electro-Loaders is given in illustrated data book.—Globe Hoist Co., 100 E. Mermaid Lane, Philadelphia 18, Pa.

Industrial Scales—Forty-four new features are added to the traditional accuracy and dependability of Toledo scales. Complete range of types and capacities are described in catalog No. 2001.—Toledo Scale Co., Toledo 1, Ohio.

Materials-handling Carriers—An informative booklet gives numerous case histories of Ross Carrier-handling in a broad variety of industries.—Clark Equipment Co., Battle Creek 73, Mich.

Lettering Machine—Booklet E-21 contains complete information on the Vari-Typer lettering machine.—Ralph C. Coxhead Corp., 720 Frelinghuysen Ave., Newark 5, N. J.

Machine Tools—Catalog 27312 fully describes boring machines, broaches, counterbores, lapping machines, and cutting tools.—Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Tubing—Catalog describes characteristics and many uses of Bundyweld copper-coated steel tubing in sizes up to ½-in. OD.—Bundy Tubing Co., Detroit 14, Mich.

Diesel Fuel System—Descriptive folder contains complete information about the new Cummins PT fuel system.—Cummins Engine Co., Inc., Columbus, Indiana.

Consulting Service—"The Inside Story of Outside Help" details Ebasco's service as engineers, constructors, and business consultants.—Ebasco Service, Inc., Dept. D, 2 Rector St., New York 6, N. Y.

Aluminum Building Products—Literature is available on roofing and siding sheets and accessories made of Reynolds "Lifetime" aluminum.—Reynolds Metals Co., Export Div., 19 E. 47th St., New York 17, N. Y.

Hydraulic Presses—The complete line of Bliss Hydro-Dynamic presses is thoroughly described and illustrated in bulletin 30-A.—E. W. Bliss Co., Canton, Ohio.

Gear-shaving Machines—Bulletin S 53-7 describes new developments in gear shaving.—National Broach and Machine Co., 5600 St. Jean, Detroit 13, Mich.

Milling Machines—Bulletin No. 4023 E describes and illustrates complete line of type WBF horizontal boring and milling machines.—Schiess Aktiengesellschaft, Hansaallee 289, Dusseldorf-Overkassel, Germany.

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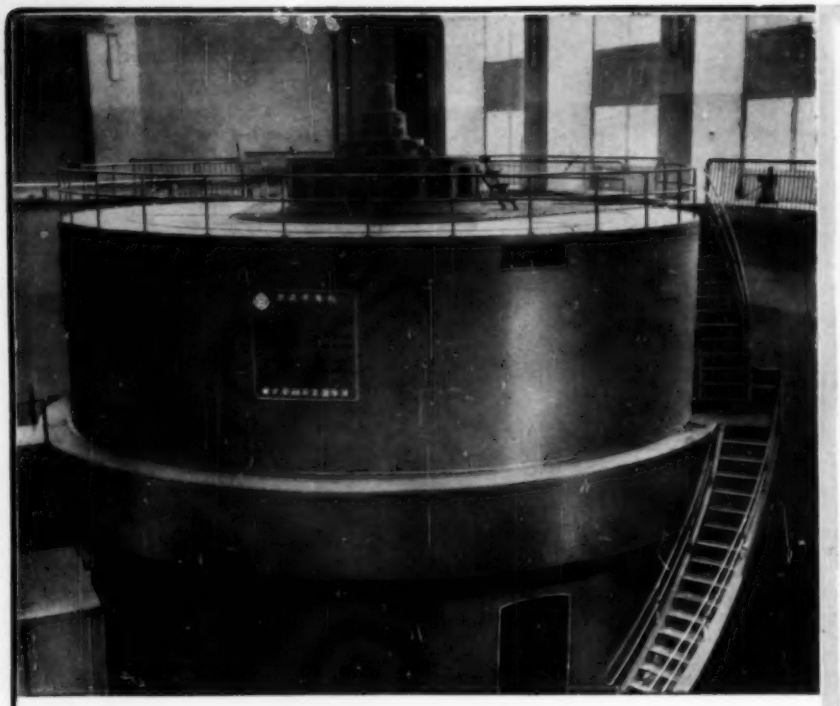

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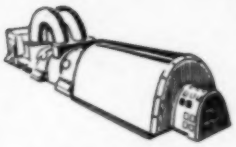

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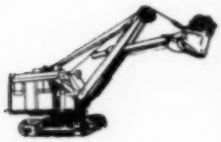

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